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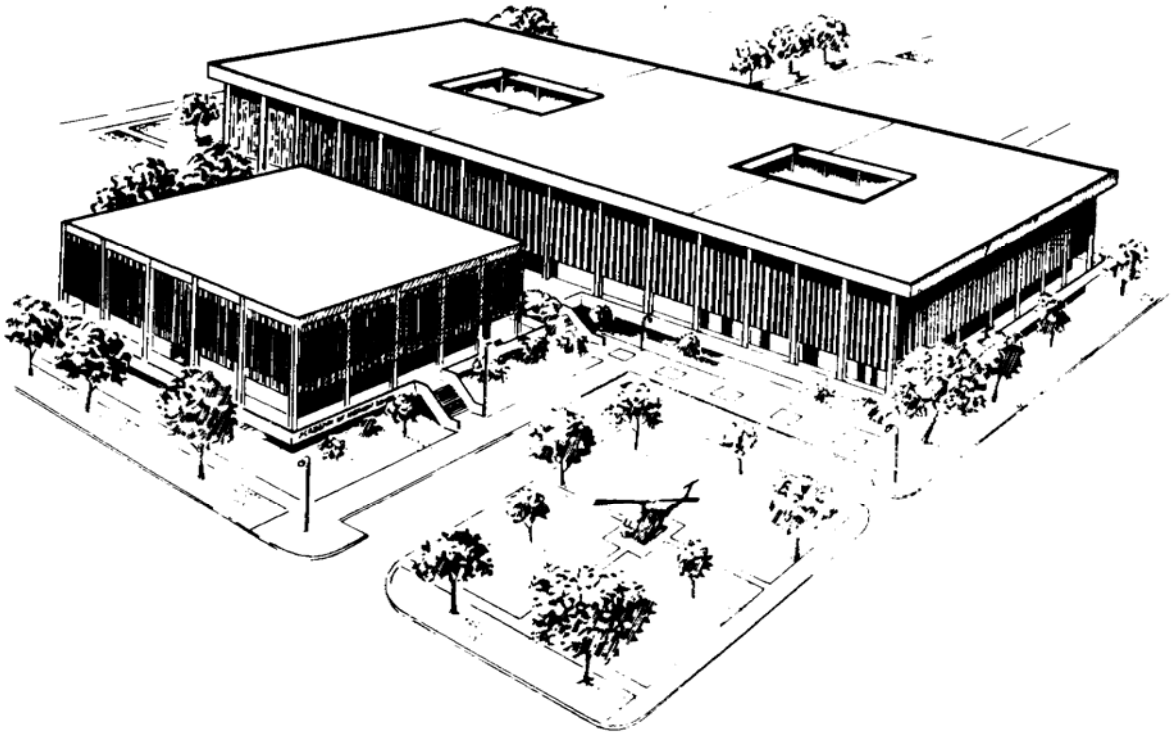
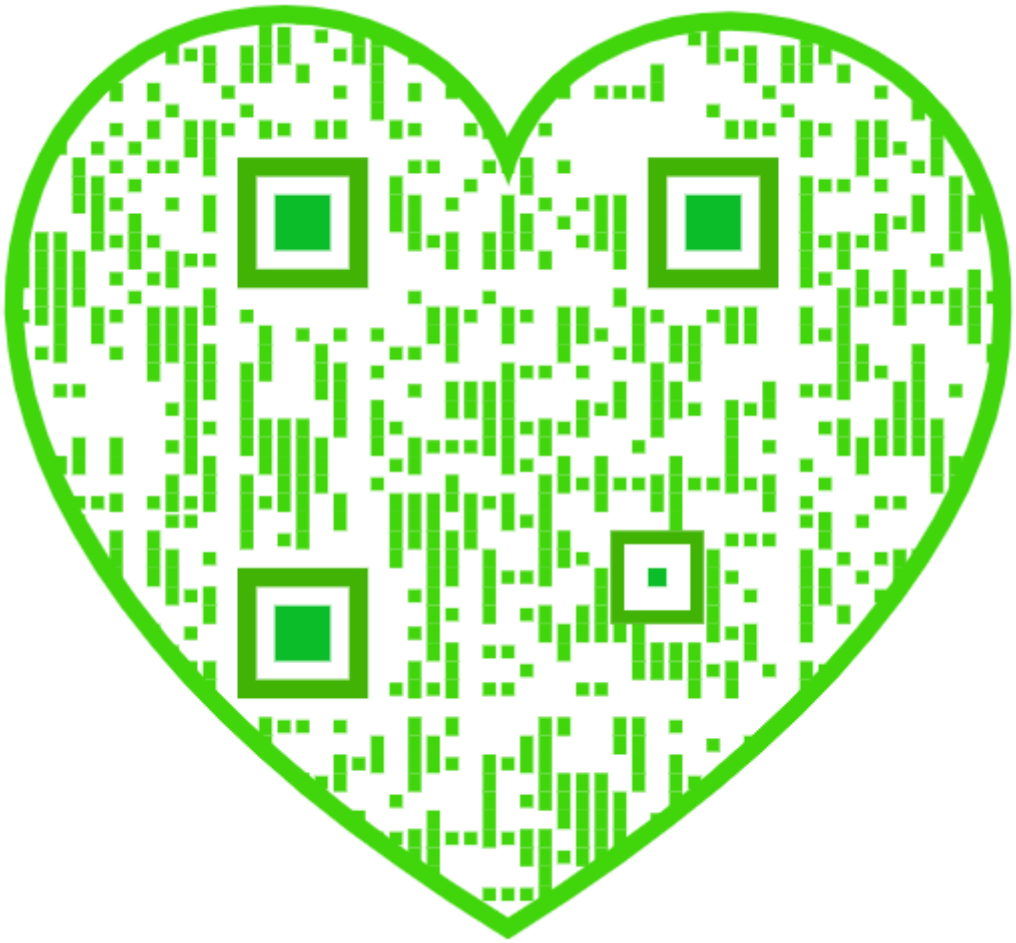


THE GENITOURINARY SYSTEM II

SUBCOURSE MD0580 EDITION 100



DEVELOPMENT

This subcourse is approved for resident and correspondence course instruction. It reflects the current thought of the Academy of Health Sciences and conforms to printed Department of the Army doctrine as closely as currently possible. Development and progress render such doctrine continuously subject to change.

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ADMINISTRATION

Students who desire credit hours for this correspondence subcourse must meet eligibility requirements and must enroll in the subcourse. Application for enrollment should be made at the Internet website: http://www.atrrs.army.mil. You can access the course catalog in the upper right corner. Enter School Code 555 for medical correspondence courses. Copy down the course number and title. To apply for enrollment, return to the main ATRRS screen and scroll down the right side for ATRRS Channels. Click on SELF DEVELOPMENT to open the application and then follow the on screen instructions.

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CLARIFICATION OF TERMINOLOGY

When used in this publication, words such as "he," "him," "his," and "men" 'are intended to include both the masculine and feminine genders, unless specifically stated otherwise or when obvious in context.

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CORRESPONDENCE COURSE OF
THE U.S. ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL

SUBCOURSE MD0580

THE GENITOURINARY SYSTEM II

INTRODUCTION

This century has seen great changes in sexual feelings, attitudes, and beliefs in American society resulting in greatly changed sexual activities and habits of Americans. Look at the massive changes in just the last forty years.

The 1950's were a time when sex was supposed to be a part of marriage. This theme is endlessly repeated in movies of those years. In the early 1960s, however the contraceptive pill appeared making premarital sex freer from unplanned pregnancy. Many decide that a sexual relationship could exist without the benefit of marriage. Sex was more openly discussed, shown, and talked about in the 60s. Topless bars appeared during these years, and the Broadway shows Hair and Oh! Calcutta with actors appearing nude on stage were performed.

In the 1970s, there was a growing trend for couples to live together prior to marriage. Many people were having sexual relationships more openly outside marriage, often without the thought of marriage to each other in the future. Sex was being thought of as not only "a marriage act" but as a recreational act. By the late 1970s and the 1980s, the growing number of individuals with several sexual partners made a change in the number of cases of sexually transmitted diseases. The number of cases of these diseases increased dramatically, some disease reaching epidemic proportions.

Some of these diseases are dealt with in this subcourse. It is important for you as a medical NCO to be informed about sexually transmitted diseases as well as other diseases and disorders of the genitalia. In many of these diseases/disorders, early diagnosis and treatment are essential to the return to complete health of the individual. In sexually transmitted diseases the first step to disease control and eventual eradication is to educate the public (here the soldier) in prevention of these disease.

Subcourse Components:

The subcourse instructional material consists of four lessons as follows:

Lesson 1, Diseases/Disorders of the Male Genitalia.
Lesson 2, Sexually Transmitted Diseases.
Lesson 3, Human Immunodeficiency Virus (HIV) and Aquired Immune Deficiency Syndrome (AIDS).
Lesson 4. Diuretics.

Here are some suggestions that may be helpful to you in completing this subcourse:

--Read and study each lesson carefully.

--Complete the subcourse lesson by lesson. After completing each lesson, work the exercises at the end of the lesson, marking your answers in this booklet.

--After completing each set of lesson exercises, compare your answers with those on the solution sheet that follows the exercises. If you have answered an exercise incorrectly, check the reference cited after the answer on the solution sheet to determine why your response was not the correct one.

Credit Awarded:

Upon successful completion of the examination for this subcourse, you will be awarded 12 credit hours.

To receive credit hours, you must be officially enrolled and complete an examination furnished by the Nonresident Instruction Branch at Fort Sam Houston, Texas.

You can enroll by going to the web site http://atrrs.army.mil and enrolling under "Self Development" (School Code 555).

A listing of correspondence courses and subcourses available through the Nonresident Instruction Section is found in Chapter 4 of DA Pamphlet 350-59, Army Correspondence Course Program Catalog. The DA PAM is available at the following website: http://www.usapa.army.mil/pdffiles/p350-59.pdf.

LESSON ASSIGNMENT

LESSON 1	Diseases/Disorders of the Genitalia.
LESSON ASSIGNMENT	Paragraphs 1-1 through 1-10.
LESSON OBJECTIVES	After completing this lesson, you will be able to:

1-1. Identify the definition and etiology that apply to each of the genital diseases or disorders listed below:

- Prostatitis
- Epididymitis
- Varicocele
- Orchitis
- Testicular torsion
- Priapism
- Phimosis
- Paraphimosis
- Vaginitis

1-2. Identify the signs/symptoms and treatment that apply to the diseases and disorders of the genitalia listed above.

SUGGESTIONS After completing the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 1

DISEASES/DISORDERS OF THE GENITALIA

Section I. DISEASES/DISORDERS OF THE MALE GENITALIA

1-1. INTRODUCTION

Diseases and disorders of the genitalia can be dangerous. Such problems are generally agreeable to therapy if the diagnosis can be established. In your later work, you may be assessing and treating these types of diseases and disorders almost on a daily basis.

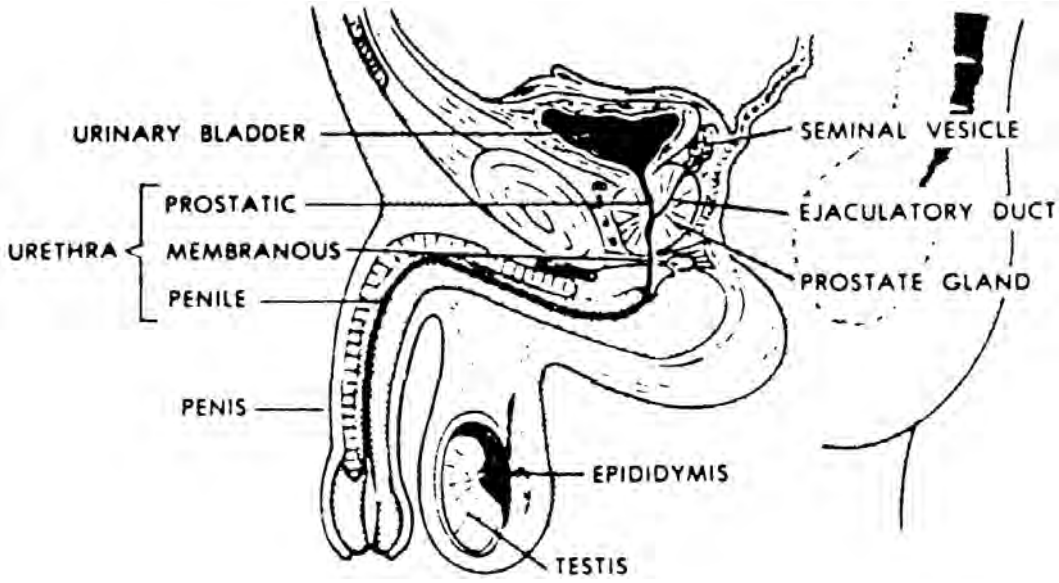

Figure 1-1. Male genitalia.

1-2. PROSTATITIS

The condition prostatitis is an inflammation of the prostate gland. Prostatitis can be divided into two main categories: (1) acute and chronic bacterial prostatitis and (2) nonbacterial prostatitis. The incidence of prostatitis increases with age.

a. **Etiology.** Bacterial prostatitis is either acute or chronic and is usually caused by gram-negative organisms such as these: Escherichia coli (most common), Enterobacter, Serratia, Klebsiella, and Pseudomonas. The causative bacterial may reach the prostate gland from the blood stream or from the urethra. Prostatitis is commonly associated with urethritis or an infection of the lower genitourinary tract (an infection such as gonorrhea). Systemic dehydration can play an important part in decreased urinary output. This decreased urinary out put allows microorganisms in the genitourinary tract to multiply.

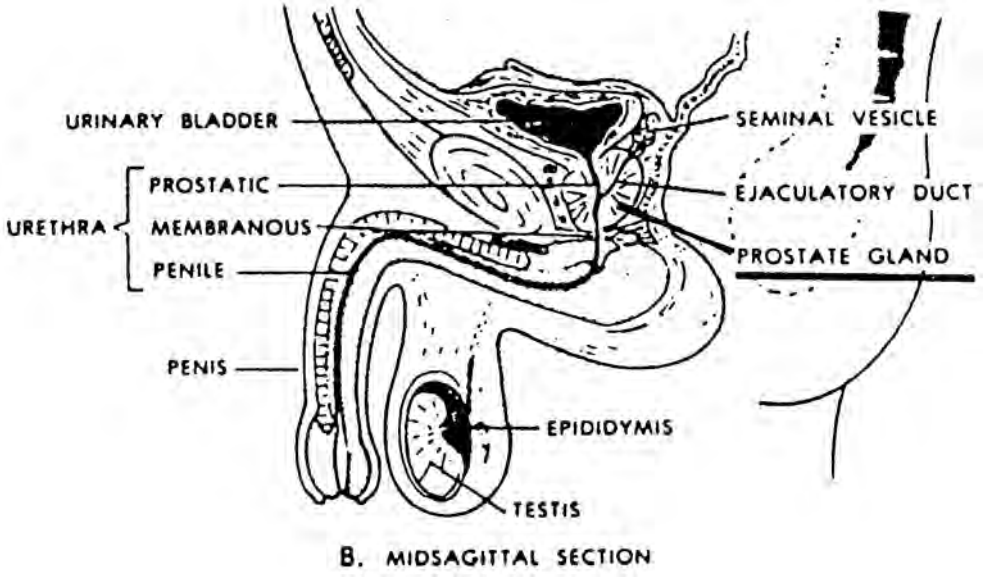

Figure 1-2. Area of prostatitis.

b. **Signs and Symptoms.** Included are the following:

(1) Burning on urination.

(2) Pain in the perineum, rectum, lower back and abdomen, glans of the penis.

(3) Chills and moderate to high fever.

(4) Dysuria, polyuria, hematuria.

(5) Urethritis.

(6) Urethral discharge (clear viscous to milk white discharge).

(7) Prostate enlarged, boggy, and very tender.

NOTE: In the condition chronic prostatitis, there may be no symptoms.

c. **Treatment.** Follow these steps.

(1) Bed rest.

(2) Balanced fluid intake.

(3) Drug therapy. Included are the following:

(a) Analgesic drugs for pain.

(b) Trimethoprim (80 mg) twice a day for 30 days OR

(c) Sulfamethoxazole (400 mg) twice a day for 30 days.

(d) For sulfa sensitive patients:

1 Gentamicin sulfate (Garamycin®).

2 Ampicillin (Polycillin®).

(4) Culture and sensitivity test of urine. This test can determine the specific drug that will combat the infection.

NOTE: Treatment will depend on the type of prostatitis present--acute or chronic bacterial prostatitis or nonbacterial prostatitis.

(5) Neither the patient nor the physician should massage or milk the penis.

d. **Special Considerations.**

(1) Be sure the patient understands that bed rest and adequate hydration are necessary. He may need stool softeners and sitz baths, as ordered by the doctor.

(2) Be sure the patient knows that he must take the prescribed drugs faithfully.

(3) It is important for him to know that he must drink at least eight glasses of water a day.

(4) Tell the patient to report immediately signs of possible adverse reaction to drugs, signs such as rash, nausea, vomiting, fever, chills, and gastrointestinal irritation.

1-3. EPIDIDYMITIS

Epididymitis is an inflammation of the epididymis. The epididymis is the comma-shaped organ which lies along the posterior border of each testicle. Each epididymis consists mostly of a tightly coiled tube, the ductus epididymis. The function of the ductus epididymis is to (1) store sperm for maturation and (2) to propel the matured sperm toward the urethra during ejaculation (sperm is propelled by contraction of the smooth muscle of the epididymis). The condition epididymides is one of the most common infections of the male reproductive tract. Care must be taken to treat this infection. Untreated, this infection may spread to the testicle itself causing orchitis (inflammation of the testis). If the condition spreads to both testicles, the patient may become sterile. Epididymitis is common in males under thirty but rarely occurs before puberty.

a. **Etiology.** Included are the following:

(1) Severe straining.

(2) Prolonged standing.

(3) Prolonged catheterization (instrumentation).

(4) Chronic prostatitis (inflammation of the prostate gland).

(5) Chronic urethritis (inflammation of the urethra).

(6) History of previous instrumentation.

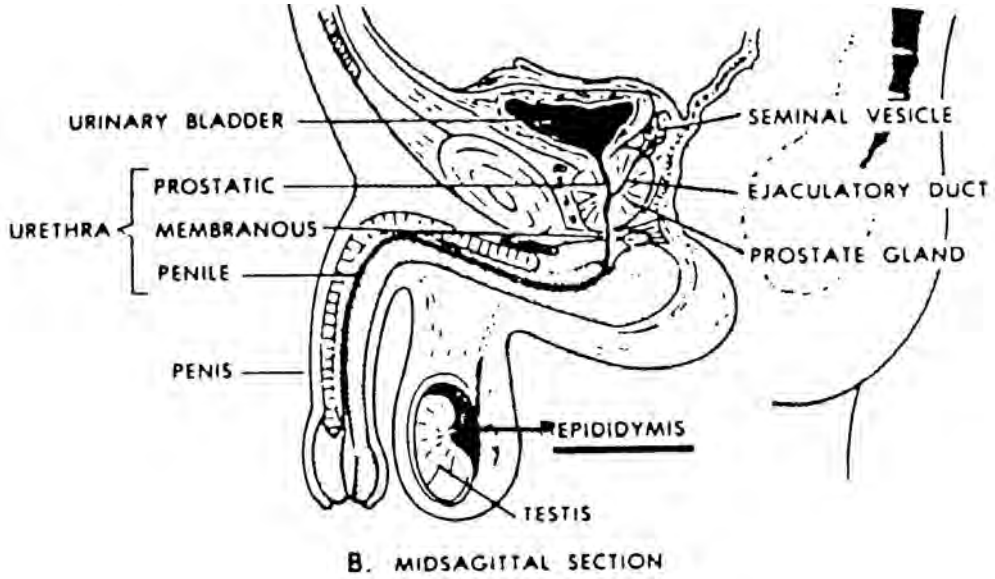

Figure 1-3. Area of epididymitis.

b. **Signs and Symptoms.** Included are the following:

(1) Fever and pain in the scrotum.

(2) Rapid unilateral swelling of the scrotum. (The scrotal sac is usually slightly swollen and a dusky red). The testes are normal.

(3) A marked tenderness over the spermatic cord, a tenderness which is relieved by lifting the testes (abnormal epididymis).

(4) Pyuria (pus in the urine).

(5) Bacteriuria (bacteria in urine).

NOTE: The problem may involve the testis and/or the entire spermatic cord.

c. **Treatment.** There are three main goals in treating epididymitis: reduce the pain, reduce the swelling, and combat infection. Begin treatment immediately since sterility is always a threat. Treat as follows:

(1) In males less than 30 years of age, torsion of the testicle should first be ruled out.

(2) In more severe cases, antibiotics such as tetracycline may be used. In men over 35 years of age, E. coli is the most frequent causative organism. For these patients, trimethoprim-sulfamethoxazole, ampicillin, or a cephalosporin should be used.

(3) Scrotal support, for a week to 10 days.

(4) Scrotal ice packs.

(5) Sitz baths, 2 to 3 times a day.

(6) Rest and sedation.

(7) Avoidance of straining and sexual excitement.

1-4. VARICOCELE

Within the spermatic cord, there is a network of veins referred to as the pampiniform plexus. A varicocele is an abnormal dilation of these veins. In physical examination, these veins feel like "a bag of worms."

a. **Signs and Symptoms.** Some cases may have no symptoms. For other patients, these signs and symptoms will be evident:

(1) Dragging scrotal sensation. The chief complaint will be that the patient feels the scrotum is heavy.

(2) Possible subfertility. Sperm travel from the vas deferens to the seminal vesicles may be hindered.

(3) Diagnosis may be made by palpation/transillumination of the scrotum. The twisted mass of veins can be felt. The scrotum will not transilluminate (light will not pass through the scrotum).

b. **Treatment.** If there are no signs or symptoms, the condition is best left along. If the patient has symptoms, refer him to the medical facility for treatment and possible surgical correction.

1-5. ORCHITIS

Orchitis is an infection of the testicles, a very painful, serious complication of epididymitis. Mumps may also cause the infection orchitis. Other causes or orchitis include a systemic infection, testicular torsion, or severe trauma.

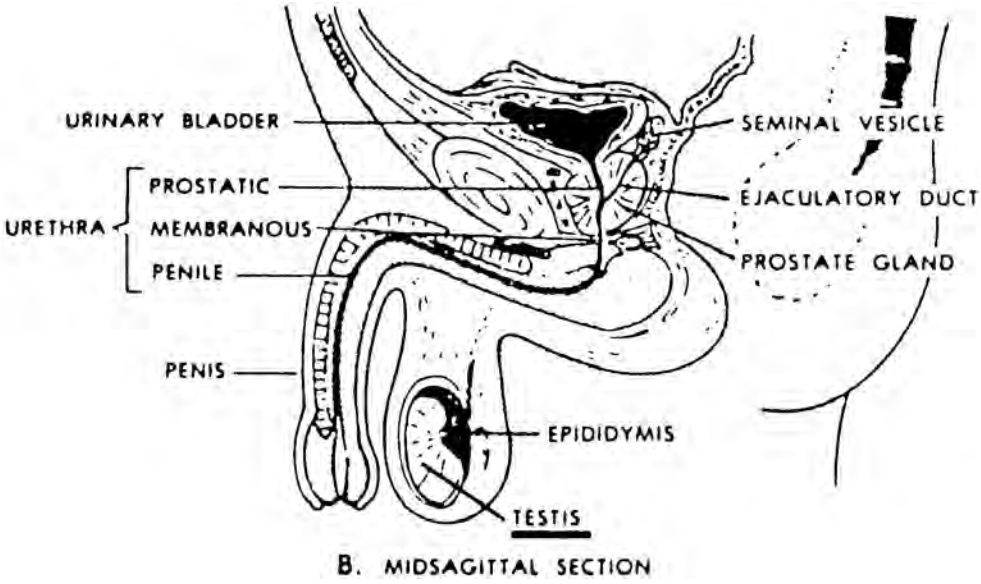

Figure 1-4. Area of orchitis.

a. **Signs and Symptoms.** Included are the following:

(1) Swollen, painful, tender testes.

(2) Redness and edema of the scrotum.

(3) Fever and prostration.

b. **Treatment.** Follow this treatment:

(1) Bed rest.

(2) Elevate and support the testes. Rolled towels may be used to elevate the testes.

(3) Treat the underlying cause by antibiotic therapy, if appropriate. Hot and cold compresses may be applied for symptomatic relief.

1-6. TESTICULAR TORSION

Testicular torsion may be defined as an abnormal twisting of the testes on its spermatic cord. This condition may be spontaneous (occurring for no reason) or may follow strenuous activity. The condition may occur at any age but is most common between the ages of 12 and 18.

a. **Signs and Symptoms.** Included are the following:

(1) Extreme local pain.

(2) Nausea and vomiting.

(3) Scrotal edema and fever.

b. **Treatment.** Refer the patient to a physician immediately. Torsion must be differentiated from inflammatory conditions within the scrotum, trauma, and testicular tumor. If doubt exists, surgical intervention is advised. Without surgery, the abnormal twisting may stop the blood flow to the testicle causing necrosis and gangrene.

1-7. PRIAPISM

This condition can be defined as an abnormal, painful, and continuous erection of the penis unaccompanied by sexual desire.

a. **Etiology.** Included are the following:

(1) Pelvic vascular thrombosis.

(2) Leukemia.

(3) Sickle cell disease (red cells roughen, becoming sickle-shaped resulting in chronic ill health).

(4) Pelvic injuries.

(5) Inflammation or infection of the genitalia.

b. **Signs and Symptoms.** As noted in the definition:

(1) Continuous erection unaccompanied by sexual desire.

(2) Pain.

c. **Treatment.** Refer the patient to a physician for assessment of the underlying cause and symptomatic treatment.

1-8. PHIMOSIS/PARAPHIMOSIS

Phimosis is a tightness of the foreskin so that it cannot be pulled back over the penis. Paraphimosis, on the other hand, is a tightness of the foreskin which, once the foreskin has been pulled back, will not allow the foreskin to return to its normal position over the glans. In either case signs of infection may be present. Treatment may be either circumcision or preliminary dorsal slit.

Section II. DISEASES/DISORDERS OF THE FEMALE GENITALIA

1-9. VAGINITIS

Vaginitis is inflammation of the vagina.

a. **Etiology.** Vaginitis is a common gynecologic disorder which is characterized by a distressing, often whitish, non-bloody discharge due to inflammation of the vagina. In adults, the vaginal discharge is usually secondary to an infection of the lower reproductive tract. Protozoa, notably Trichomonas vaginalis, are responsible for one third of the vaginitis cases. Candida albicans is a type of fungus which is a frequent cause of vaginitis in women who are either pregnant or who are diabetic. Other causes of vaginitis include bacteria, such as Escherichia coli, Staphylocci, and foreign bodies.

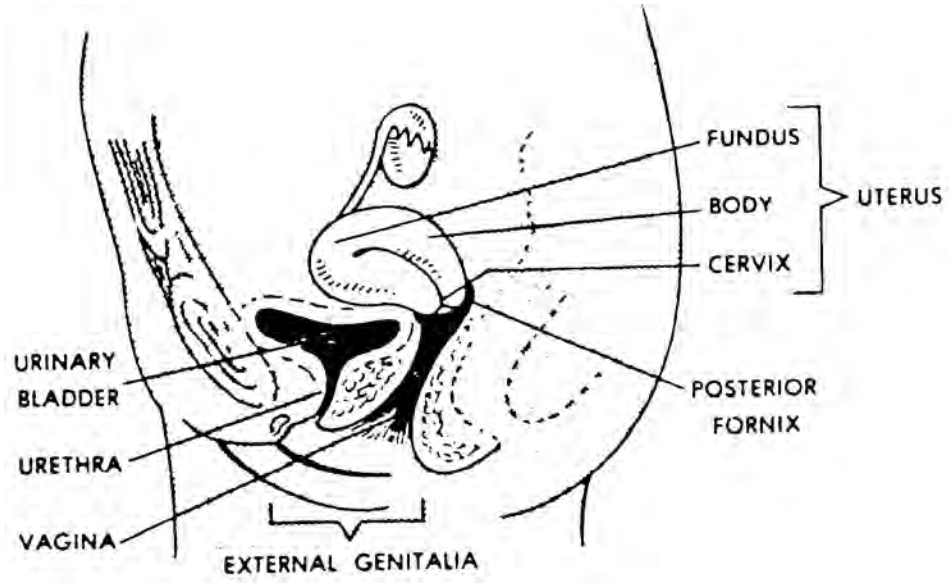

Figure 1-5. Female genitalia.

b. **Signs and symptoms.** Signs and symptoms vary with the cause of the infection.

(1) In bacterial infections, the discharge is yellow to gray and frothy with a foul odor. Many white blood cells are contained in the discharge.

(2) In trichomonal vaginitis, the discharge is yellow-green, frothy, and has a foul odor. There may be red "strawberry" lesions on the cervix.

(3) In candida vaginitis, the discharge is usually white and thin with curd-like flecks. The discharge has a moldy odor.

c. **Treatment.** Treatment also varies according to the cause of the infection.

(1) Bacterial origin caused by E Coli and many other gastrointestinal bacteria. Treat as follows:

(a) Sulfathiazole (Sultrin Triple Sulfa Cream or povidone-iodine, Betadine Vaginal Gel®) applied with an applicator.

(b) Systemic antibiotics may be required.

(2) Parasitic origins caused by trichomoniasis. Use meteonidozale (Flagyl®) to treat males and females. Adverse reactions include gastrointestinal problems such as stomatitis, nausea, vomiting, and diarrhea. Other adverse reactions include a sharp metallic, unpleasant taste. DO NOT use alcohol for at least 72 hours after completing Flagyl® therapy. The drug dosage and the length of treatment vary from 1 day (2 grams in one or two doses) to 10 days (250 mg three times a day).

(3) Fungal origins caused by Candida albicans. Give miconazole (Monistat®) cream and vaginal suppositories for the treatment of vaginal candidiasis. The dosage should be intravaginally for 7 days. If needed, the dosage may be repeated. Adverse reactions to this cream include burning, itching, or irritation to the vaginal area. Discontinue use of the medication if hives or skin irritation occur. To treat Candida albicans, give mycostatin (Nystatin®) cream, ointment, tables, and topical powders. These can be used for the skin, the genitourinary tract, and mucous membranes, as appropriate.

NOTE: Nystatin® is not suitable for treating systemic infections because Nystatin® it is too toxic for parenteral use. Additionally, this medication is not absorbed from the genitourinary tract.

(4) Recurrent or relapsing infection. Treat as follows:

(a) Control or eliminate the systemic factors.

(b) Eradicate intestinal source if the infections is caused by the migration of fecal flora to the perineum.

(c) Sexual partner may need to use condoms.

1-10. CLOSING

Diseases and disorders of the genitalia are very common and with practice you will become proficient in recognizing these problems. Recognition is probably the most important step with these diseases. If diseases or disorders of the genitalia go unrecognized and, therefore, untreated, they may spread to other parts of the body, possibly causing much greater problems.

Continue with Exercises

EXERCISES, LESSON 1

INSTRUCTIONS: Answer the following exercises by marking the lettered response that best answers the question or best completes the incomplete statement or by writing the answer in the space provided.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced with the solution.

1. Inflammation of the prostate, acute or chronic, is termed _____.

2. List four signs/symptoms of prostatitis.

   a. _____.

   b. _____.

   c. _____.

   d. _____.

3. Treatment for prostatitis includes bed rest, balanced fluid intake (8 glasses of fluid per day), and drug therapy to include _____ for pain.

4. Epididymis is an infection of the epididymis which is the _____ _____.

5. Name three possible causes of epididymitis.

   a. _____.

   b. _____.

   c. _____.

6. List four signs/symptoms of epididymitis.

   a. _____.

   b. _____.

   c. _____.

   d. _____.

7. The main goals for treatment of epididymitis are _____, reduce the swelling, and _____.

8. _____ is a scrotal condition in which the veins in the scrotum and above the testes become dilated, elongated, and twisted.

9. The chief complaint of a patient suffering from the condition defined in test #8 is _____.

10. Causes of the painful and serious condition orchitis include systemic infection, severe trauma, testicular torsion, and _____.

11. What is testicular torsion? _____

    _____

12. Priapism is _____

    _____

13. Three causes of priapism are:

    a. _____.

    b. _____.

    c. _____.

14. A foreskin so tight that it cannot be pulled back over the penis is the definition of the condition _____.

15. _____, on the other hand, is a tightness of the foreskin which will not allow the foreskin to fall back to its normal position once it has been pulled back over the penis.

16. What is vaginitis? _____

17. The three types of vaginitis infections are _____ infections, _____ vaginitis, and _____ vaginitis.

18. Signs/symptoms of _____ vaginitis include a discharge that is green-tinged, thin, and bubbly with a foul odor.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 1

1. Prostatitis. (para 1-2)

2. Your are correct if you listed any four of the following:

Burning on urination.	Dysuria.
Pain in the perineum, rectum, lower back and abdomen, glans of the penis.	Polyuria.
	Hematuria.
	Urethritis.
Chills and moderate to high fever.	Urethral discharge.
	Enlarged, boggy, verytender prostate.

(paras 1-2b(1) through (7))

3. Analgesics. (para 1-2c(3)(a))

4. Cordlike excretory duct of the testicle. (para 1-3)

5. You are correct if you listed any three of the following:

Severe straining.	Chronic prostatitis.
Prolonged standing.	Chronic urethritis.
Prolonged catheterization.	History of previous instrumentation.

(paras 1-3a(1) through (6))

6. You are correct if you listed any four of the following:

Fever and pain in the scrotum.	Pyuria.
Rapid lateral swelling of the scrotum.	Bacteriuria.
	Bloody ejaculate.
Marked tenderness over the spermatic cord.	(para 1-3b(1) through (6))

7. Reduce the pain.
   Combat the infection. (para 1-3c)

8. Varicocele. (para 1-4)

9. There is a sensation that the scrotum is dragging. (para 1-4a(1))

10. Mumps. (para 1-5)

11. Testicular torsion is an abnormal twisting of the testes on its spermatic cord. (para 1-6)

12. An abnormal, painful, and continuous erection of the penis, unaccompanied by sexual desire. (para 1-7)

13. You are correct if you listed any three of the following:

Pelvic vascular thrombosis.	Pelvic injuries.
Leukemia.	Infection of the genitalia.
Sickle cell disease.	Inflammation of the genitalia.

(paras 1-7a(1) through (5))

14. Phimosis. (para 1-8)

15. Paraphimosis. (para 1-8)

16. Vaginitis is inflammation of the vagina. (para 1-9)

17. Bacterial.
Trichomonal.
Candida. (paras 1-9b(1) through (3))

18. Trichomonal. (para 1-9b(2))

End of Lesson 1

LESSON ASSIGNMENT

LESSON 2 Sexually Transmitted Diseases.

LESSON ASSIGNMENT Paragraphs 2-1 through 2-19.

LESSON OBJECTIVES After completing this lesson, you will be able to:

2-1. Identify the types of sexually transmitted diseases.

2-2. Identify general preventive measures used against sexually transmitted diseases.

2-3. Identify the etiology of specific types of sexually transmitted diseases.

2-4. Identify the signs, symptoms, and complications of these sexually transmitted diseases:

Gonorrhea.
Nonspecific genital infections.
Chlamydial infections.
Syphilis.
Herpes simplex.
Venereal warts.
Chancroid.
Granuloma inguinale.

2-5. Identify laboratory tests and other procedures used to determine specific sexually transmitted diseases.

2-6. Identify procedures for the treatment of specific sexually transmitted diseases.

2-7. Identify the procedures for conducting a contact interview.

SUGGESTIONS After completing the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 2

SEXUALLY TRANSMITTED DISEASES

Section I. GENERAL INFORMATION

2-1. INTRODUCTION

A staggering amount of money, time, and effort is being spent on the control of sexually transmitted diseases, yet the number of cases of these diseases is still on the rise. Sexually transmitted diseases, also known as STDs, include infections formerly called venereal diseases (VD) as well as various other infections that are sometimes transmitted by nonsexual routes. You will be able to diagnose and treat these diseases and manage many of the common complications with the knowledge acquired through this lesson.

2-2. DISEASE TRANSMISSION

a. The most common and most efficient route of transmission of some infectious diseases is by sexual contact. As sexual behavior has changed over the past years, the frequency of these infections has increased. Some infectious diseases (herpetic and chlamydial genital infections, for example) are now recognized as being primarily transmitted by sexual contact. Also some rectal and pharyngeal infections are caused by sexual contact.

b. Whether the agents are bacteria, spirochetes, or viruses, the infectious agents that cause sexually transmitted disease flourish when in contact with mucous membranes. Early in the infection, lesions may occur on the genitalia or other sexually exposed mucous membranes. The infection spreads, however, to nongenital tissues and organs and may seem to be any one of several noninfectious disorders. In the later phases of all venereal diseases, the patient may appear to be recovered from the infection but still be able to transmit the infection through sexual contact.

c. A patient with a sexually transmitted disease usually has one or more sexual contacts who must be diagnosed and treated. Some venereal diseases must be reported to public health authorities. The most common of the sexually transmitted diseases are the following:

(1) Gonorrhea.

(2) Syphilis.

(3) Condyloma (wart-like growth).

(4) Chlamydial genital infections.

(5) Herpes-virus genital infections.

(6) Trichomoniasis.

(7) Chancroid.

(8) Granuloma inguinale.

(9) Scabies.

(10) Dermatitis caused by Phthirus pubes (pubic lice).

NOTE: Not a disease, but rather an irritant, pubic lice can be transmitted by sexual contact. These lice may also be picked up from sheets, towels, or clothing used by an infected person.

2-3. SPECIFIC SEXUALLY TRANSMITTED DISEASES

This lesson deals with seven sexually transmitted diseases. These are gonorrhea (the most common), nonspecific genital infection, chlamydial infections, syphilis, herpes (II) progenitalis, venereal warts (genital warts), chancroid, and granuloma inguinale. It is of great importance that soldiers have sufficient knowledge to suspect signs and symptoms of such diseases and also to have the knowledge to prevent contraction of such diseases. Preventive measures include using condoms and limiting the number of sexual partners. DO NOT use oral antibiotic prophylaxis.

Section II. SPECIFIC TYPES OF SEXUALLY TRANSMITTED DISEASES

2-4. GONORRHEA

This sexually transmitted disease is also known by a variety of names -- clap, the drip, dose, gleet, GC, strain, and running. Gonorrhea is a common venereal disease which is an infection of the genitourinary tract, the infection usually occurring in the urethra and the cervix. Occasionally, the rectum, pharynx, and the eyes can become infected. If gonorrhea is not treated, the disease can spread through the blood to the joints, tendons, meninges, and endocardium. Gonorrhea can lead to acute salpingitis, pelvic inflammatory disease (PID) and sterility in females. Both males and females recover well if they receive adequate treatment. There is a high frequency of gonorrhea in unmarried people with the most cases involving persons between the ages of 19 and 25.

a. **Etiology.** The organism which causes gonorrhea is Neisseria gonorrhoea, a gram-negative diplococci which is kidney-shaped and usually intracellular. Gonorrhea is spread by sexual intercourse. An individual may become infection following sexual contact with an infected person.

b. **Signs and Symptoms.** Males frequently complain of a burning sensation during urination and a purulent discharge from the urethra during onset. Females are frequently symptomless carriers of the disease for weeks or months.

(1) Male--acute gonorrhea. Included are the following:

(a) After a two to eight day incubation period (rarely 1 to 31 days), a male may develop dysuria and purulent discharge. Initially with dysuria, there will be tingling or burning on urination. Hours to three days later, there will be more pain on urination.

(b) The purulent discharge will be serous or milky. This discharge progresses to yellow creamy heavy discharge, sometimes blood tinged. Other signs and symptoms include frequent urination (sometimes incontinence), discomfort and sometimes discharge with defecation, sore throat, and red and swollen lips of the meatus.

NOTE: Dysuria and urethral discharge are seen in urethritis in general.

(2) Female--acute gonorrhea. Signs and symptoms usually occur from 7 to 21 days after contact. Included are the following:

(a) Dysuria.

(b) Increased vaginal discharge.

(c) Mucopurulent discharge from the urethra (expressed by pressure on the symphysis pubis), Skene's ducts, Bartholin's glands, and from the cervix which may be reddened.

NOTE: The organism Trichomonas vaginitis commonly causes copious vaginal discharge and may be confused with gonorrhea. This organism DOES NOT cause gonorrhea.

(d) Frequent urination.

(e) Low back pain.

(f) Low abdominal pain.

(g) Discomfort and possible discharge with defecation.

(h) Sore throat.

c. **Diagnosis.** Follow this procedure:

(1) History. Establish all sexual contacts.

(2) Physical examination. Rectal, pelvic, and oral examination should be conducted.

(3) Laboratory test. A laboratory culture and a microscopic analysis of the discharge from the reproductive organs, rectum, or throat.

(4) Laboratory test. The infecting organism can be isolated by a culture from the site of the infection (the urethra, cervix, rectum, or pharynx). This culture is grown on a Thayer-Martin or Trans-grow medium. A gram-stain smear of ureteral discharge allows rapid identification of gonococcus in males. The cervical gram-stain, however, is only about 60 percent reliable in women.

d. **Treatment for Uncomplicated Gonorrhea**.

(1) Antibiotic therapy. One medication or a combination of medications may be used.

(a) Give 1 gram of probenecid (Benemid®) by mouth to block penicillin from being excreted by the body. Thirty minutes later administer 4.8 million units of aqueous procaine penicillin injected at two separate sites in a large muscle mass.

(b) If the patient is allergic to penicillin, give tetracycline TCN (Tetracyn®) in the dosage 500 mg by mouth four times a day for five days.

(c) Another medication for the patient allergic to penicillin might be an ampicillin such as Omnipen® or Polycillin®) or amoxicillin by mouth. Either medication should be given with 1.0 gram Probenecid (Benemid®). These drugs are less effective than other forms of treatment.

(d) Spectinomycin (Trobicin®) in the dosage of 2.0 grams given in a large muscle mass may also be substituted for penicillin.

(2) Sexual abstinence. Advise the patient to abstain from sexual activity until his cure is confirmed. Warn the patient that he is still contagious and can transmit the gonococcal infection until he is pronounced cured.

(3) Male restraint. A male should not "milk" the penis for urethral discharge.

NOTE: Probenecid (Benemid®) raises the blood levels of the penicillin given a gonorrhea patient and prolongs the blood level concentrations by inhibiting excretion in the kidney.

(4) Follow-up culture. Seven to ten days after the treatment is completed, a follow-up culture should be taken from the infected site.

(5) Retreatment, if necessary. Most "failures" are due to reinfection. Penicillin resistant Neisseria gonorrhoea is an increasing problem. A culture must be taken on all treatment failures to isolate the causitive agent and identify the exact type of organism. Once identified, treatment can be started again.

e. **Complications of Gonorrhea.**

(1) Early complication in the male. Included are the following:

(a) Prostatitis -- prostatic abscess which can be detected by a rectal examination.

(b) Cystitis -- fever, chills, suprapubic tenderness.

(c) Epididymitis -- detectable by a scrotal examination.

(d) Proctitis -- occurring mostly in homosexuals.

(2) Local complication in the female. Included are the following:

(a) Infection of the endocervical canal.

(b) Infection of the periurethral (Skene's) gland.

(c) Salpingitis (inflammation of the fallopian tubes). Untreated, this condition may cause peritonitis.

(3) Late complications for both sexes. Included are the following:

(a) Arthritis. This is a common complication of gonorrhea. Gonorrheal cause arthritis; involves the knees, ankles, and wrists. The problem is more common in females, is acute at the onset, and is characterized by severe pain in a joint. Iritis or conjunctivitis may accompany this type of arthritis.

(b) Bacteremia. Bacteremia is the presence of living bacteria in the blood. Signs and symptoms include:

1 Fever spikes.

2 Chills.

3 Flitting joint pains.

4 Increased leukocytes.

5 Appearance of scantly pustular and petechial skin lesions toward the extremities.

(c) Endocarditis. Endocarditis (a disease caused by infection of the lining of the cardiac chambers) develops rarely, but if it does, signs and symptoms include heart murmurs and embolic phenomena.

(d) Conjunctivitis. This is the commonest form of eye involvement. The infecting agent may go directly into the conjunctival sac of the eye. Proper treatment is essential to keep the conjunctivitis from progressing rapidly to panophthalmitis (generalized infection and inflammation of the eyeball) and subsequent loss of the eye.

(e) Meningitis. This infection can occur but does so rarely as a result of a gonorrheal infection.

2-5. NONSPECIFIC GENITAL INFECTIONS

A group of infections with similar manifestations that are not linked to a single organism have been grouped together and called nonspecific genital infections. Included in this group are nonspecific urethritis (NSU), nonspecific gonococcal urethritis (NGU), and nonspecific sexually transmitted (NSI). These infections became more prevalent in the mid-1960's. If both sexual partners are treated at the same time, treatment is usually successful.

a. **Etiology.** Causes include the following:

(1) Infection of the urethra or cervix not caused by gram negative Neisseria gonorrhoea.

(2) Chlamydia infections account for about half the cases.

(3) These infections may or may not be spread by sexual activity.

b. **Signs and Symptoms in Men.** Signs and symptoms occur from 7 to 28 days after intercourse. Included are the following:

(1) Mild dysuria/urethral discomfort with a mucopurulent discharge.

(2) Symptoms show up in the morning when the lips of the meatus may be stuck together with dried secretion.

(3) Red meatus.

(4) Proctitis (inflammation of the rectum) and pharyngitis (inflammation of the pharynx) may develop after rectal and orogenital contact.

c. **Signs and Symptoms in Women**. If a sexual partner has nonspecific urethritis, the female will probably have a nonspecific genital infection. Also included are the following:

(1) Vaginal discharge.

(2) Mild dysuria (difficulty or pain in urination).

(3) Pelvic pain.

(4) Dyspareunia (difficulty or pain in intercourse).

(5) Possible cervicitis (inflammation of the uterine cervix).

(6) Urethritis (inflammation of the urethra) with mucopurulent (containing mucus and pus) secretion in the urethra.

d. **Treatment.** Treatment is based on bacteriologic examination to include a gram stain. Untreated symptoms and signs subside within 4 weeks in 60 to 70 percent of the patients. The signs and symptoms may recur often with complications. To treat, follow this procedure:

(1) The patient should abstain from sexual intercourse until cured.

(2) Give tetracycline (Tetracyn®) or Erythromycin (Erthrocin®), Ilotycin®).

NOTE: Drugs of choice for both sexes are tetracycline and erythromycin.
Tetracycline is contraindicated in pregnant females.
Spectinomycin in the dosage of 2 gm IM may also be considered.

(3) Both partners must be treated to prevent reinfection.

2-6. CHLAMYDIAL INFECTIONS

As members of our society have become more active sexually, the types and number of cases of sexually transmitted infections have increased. Chlamydial infections have recently been recognized as a type of systemic infection which is transmitted sexually. Sexually transmitted chlamydial infections are caused by the bacterial Chlamydia trachomatis. About three to four million cases of chlamydial infections occur each year. These infections are not as well known as other sexually transmitted diseases such as gonorrhea, syphilis, or AIDS for several reasons. First, it is difficult to grow C. trachomatis in the laboratory. Also, these infections are often undetected because the patient does not show specific medical symptoms. Nevertheless, chlamydial infections cause serious health problems if undetected and thus untreated.

a. **Possible Health Problems in Males.**

(1) About half of all cases of nongonococcal urethritis (infection of the urethra not due to gonorrhea) are caused by Chlamydia trachomatis.

(2) Each year this organism causes about 500,000 cases of acute epididymitis (infection of the epididymis) in the United States.

NOTE: Currently, males with chlamydial infections do not seem to suffer long term consequences from these infections even if the infections are chronic or recurrent. However, males who are not treated for chlamydia infections will almost certainly pass the infection to their sex partners. Females have serious problems from these infections.

b. **Possible Health Problems in Females.**

(1) The urethral syndrome is the female counterpart of the male's chamydial urethritis.

(2) Chlamydia causes cervicitis (infection of the cervix).

(3) Pelvic inflammatory disease (PID) is caused by this organism. When PID reaches the Fallopian tubes, the female may become sterile.

(4) Chlamydia may infect the endometrium (inner lining) of the uterus causing chlamydial endometritis.

(5) Chlamydial infections during pregnancy are passed to the newborn during childbirth, a source of conjunctivitis (a type of eye infection) and chlamydial pneumonia (a lung infections) in newborns.

NOTE: Chlamydial pneumonia is not usually serious in newborn, but chlamydial conjunctivitis can cause chronic eye disease.

c. **Signs/Symptoms in Males.** Included are the following:

(1) In urethritis, signs and symptoms occur after one to three weeks' incubation period. There are two primary signs/symptoms which usually occur together. There is a burning with urination and a whitish or clear urethral discharge. These symptoms are usually milder than in gonorrhea.

(2) In epididymitis, signs and symptoms include:

(a) Swelling, pain, and tenderness in the scrotum (usually on only one side).

(b) Urethritis.

(c) Pain may be so severe that the patient cannot walk or run comfortably. On the other hand, pain may be low-grade, giving the individual only a feeling more like an aching sensation than a searing pain.

(d) Sexual activity becomes unpleasant for the affected male because sexual arousal pulls the scrotum up toward the body. This creates painful pressure on the infected epididymis.

d. **Signs/Symptoms in Females.** Included are the following:

(1) In chlamydial cervicitis, there are often no symptoms. In a small percentage of women, there is a cloudy mucous discharge from the cervix. Sometimes there is a mild discomfort or itchiness in the genitals. In most cases. there are no symptoms, so the female does not know that she has an infection that needs treatment.

(2) In chlamydial urethritis, only about one third of those females infected have signs and symptoms. These are:

(a) Burning with urination; frequent urination.

(b) Urethal discharge.

(c) Soreness at the opening of the urethra.

(3) In chlamydial pelvic inflammatory disease (PID), signs and symptoms are more evident.

(a) Sudden onset of lower abdominal pain.

(b) Vaginal bleeding.

(c) Fever.

(d) Dyspareunia (painful intercourse).

(e) Pressure on the lower abdomen during a pelvic examination is painful.

NOTE: Even in these infections that persist over a long period of time, there may be no signs or symptoms.

e. **Treatment.** Several antibiotics are effective in treating chlamydial infections. Tetracycline (doxycycline) is currently the drug of choice except for pregnant females. Alternative drugs are erythromycin and sulfamethoxazole. The drug of choice for pregnant females is erythromycin.

NOTE: Penicillin is NOT effective against chlamydial infections.

f. **Additional Considerations.** In many instances, individuals with chlamydial infections do not have signs or symptoms. In some cases, there are signs and symptoms of the infection. An individual diagnosed as having a chlamydial infection who has symptoms should notify any sexual partner with whom he has had sex in the thirty days before the appearance of infection symptoms. The sexual partner or partners need to seek medical evaluation and treatment.

2-7. SYPHILIS

Syphilis is a chronic, infectious, venereal disease which was first publicly noted in the late fifteenth century when this disease reached epidemic proportions in Europe. The disease proved fatal to most who contracted it. Today about 25,000 new cases of syphilis are reported in the United States each year. If the patient is treated early, the chances for a complete cure are good. Without treatment, syphilis leads to crippling or death.

a. **Etiology.** Syphilis is a chronic, infectious, venereal disease which begins in the mucous membranes and quickly enters the systems of the body, spreading to the lymph nodes nearby and into the bloodstream. The disease is spread by a spiral-shaped microorganism named Treponema pallidum, a microorganism which was identified in 1905. The microorganism cannot survive for long outside the human body, but is can be spread by sexual activity.

b. **Classification.** Syphilis can be either acquired or congenital. It is acquired through sexual activity from an infected partner to an uninfected partner. Congenital syphilis is given to an unborn baby through infecting organisms in the mother's bloodstream when the organisms cross the placenta.

c. **Stages of the Disease.**

(1) Terminology for stages of syphilis varies, but four stages are commonly identified:

(a) Primary stage syphilis.

(b) Secondary stage syphilis.

(c) Latent stage (early and late) syphilis.

(d) Tertiary stage syphilis.

(2) A patient in either the primary or secondary stages of syphilis is very infectious. An individual in the early latent stage has had the disease less than two years and is to be considered infectious. An individual in the late latent stage has had the infection more then two years and is not potentially infectious. In the tertiary (late) stage, the individual is not considered infectious.

d. **Signs and Symptoms of the Stages of Syphilis**.

(1) Primary syphilis. The first sign of syphilis is a sore called a chancre. One or more of these sores occur anywhere from 10 to 90 days after contact with an infected carrier. Usually, the sore or sores appear two to four weeks after contact, the most common locations being the genitals and the anus. Other locations of occurrence include the lips, mouth, tongue, breast, or any part of the body where the infecting organism entered the skin. The sore develops at the inoculation site as a red papule that soon erodes, forming an ulcer (a round or oval shape surrounded by a red rim). No pain is involved. Even without treatment, the sore usually heals in four weeks leading the patient to believe that he is cured -- not true.

(2) Secondary syphilis. If the patient has not received effective treatment for primary syphilis, secondary syphilis may develop from one to eight weeks after infection. In approximately 25 percent of patients, there is a healing primary chancre. Signs and symptoms of this stage, which can come and go from time to time, usually last from three to six months. Additional signs/symptoms include:

(a) Weeping papules on the hands and the soles of the feet and moist skin areas (condylomas).

(b) Painless mucous membrane lesions formed in the mouth, inside the nose, and in the anogenital area.

(c) Fever and malaise.

(d) Maculopapular skin rash (raised lesions on discolored skin). A pale red or pinkish rash is often found on the palms and soles of the patient's feet.

(e) Seldom purpuric; that is, rarely is there spontaneous bleeding causing purpura (a small hemorrhage on the skin, mucous membrane, or serosal surface).

(f) Hair loss (alopecia).

(g) Meningitis.

(h) Hepatitis.

(i) Inflammation of the bone (osteitis).

(j) Arthritis.

(k) Inflammation of the iris (iritis).

NOTE: Signs and symptoms of syphilis in the secondary stage are varied giving this stage of the disease the nickname "the great imitator."

(3) Latent ("hidden") syphilis. Ineffectively treated syphilis or untreated syphilis passes into this third state. The latent syphilis stage is further divided into two stages: the early latent syphilis stage and the late latent syphilis stage.

(a) Latent syphilis stage. In the early latent syphilis stage, defined as being the first two years after initial infection, infectious lesions may recur. During this period, the patient may appear to have no physical signs. The only significant laboratory finding is a positive serologic test.

(b) Late latent syphilis stage. This stage is defined as being more than two years after infection. In this stage, the patient has no physical signs, and recurring infectious lesions are rare. This stage may last a few years or the rest of the patient's life. In untreated cases, about one third of those infected will develop tertiary (late) syphilis.

(4) Tertiary (late) syphilis stage. This stage of the disease involves serious problems and is the final, destructive but noninfectious stage of syphilis. Complications from the medical problems of this stage can cause paralysis, insanity, blindness, and death. Health problems which follow are characteristic of this stage of syphilis:

(a) Late benign syphilis. Lesions called gummas may appear on the skin, bones, mucous membranes, upper respiratory tract, liver, or stomach. Since gummas can be found on any bone and in any organ, the possibilities for damage are great. Often the patient suffers blindness and weight loss, but also bones and organs may be destroyed causing death.

(b) Respiratory and cardiovascular problems. Gummas involving the respiratory tract can cause respiratory problems. Cardiovascular problems may be caused by damage to the elastic tissue of the aorta.

(c) Neurosyphilis. About eight percent of the patients with tertiary untreated syphilis develop neurosyphilis. Neurosyphilis is syphilis of the nervous system. The central nervous system has been affected by syphilis with possible effects including madness, palsies, wide-based gait, inability to walk in the dark, and a general weakness.

e. **Diagnosis.** Although syphilis is usually diagnosed by a blood test, correct diagnosis also depends on some additional tests. Diagnosis proceeds as follows:

(1) History. Take the patient's history to include information about any previous infection, any parental infection, recent antibiotics taken, and signs or symptoms the patient remembers.

(2) Physical examination. The physical examination is done to determine the general health of the patient as well as to look for signs and symptoms of syphilis. The physician will be looking for chancres (characteristic of primary syphilis), symmetric mucocutaneous lesions and general lymphadenopathy (beginning secondary syphilis), gummas (lesions typical of late syphilis). These and other signs/symptoms help determine the stage of the disease.

(3) Laboratory. A variety of tests are used including the Fluorescent Treponemal Antibody-Absorption (FTA-ABS) test, the Venereal Disease Research Laboratory (VDRL) slide test, and the Rapid Plasma Reagin (RPR) test.

f. **Differential Diagnosis.** If there is some question as to whether the patient has syphilis or a disease whose symptoms resemble those of syphilis, a differential diagnosis must be done. A differential diagnosis is one in which the signs and symptoms of two or more diseases are systematically compared and contrasted to decide which disease is making the patient ill. If you suspect that the patient has primary syphilitic chancre, compare and contrast that sore with lesions that might be chancroid, granuloma inguinale, or herpes progenitalis. If you suspect that the patient has secondary syphilis, remember that other skin conditions (measles and drug reactions, for example) can be mistaken for the maculopapular skin rash of secondary syphilis.

g. **Treatment.**

(1) Treatment of choice. In its primary or secondary stages, syphilis can be easily treated with one injection of penicillin. The injection is penicillin G benzathine Bicillin in the dosage 2.4 million units intramuscularly. If the patient has had syphilis for more than a year, it is probably late syphilis requiring penicillin G benzathine Bicillin in the dosage of 2.4 million units intramuscularly once a week for three weeks.

(2) Alternative treatments. An alternative treatment is to use aqueous procaine penicillin G (Wycillin®) 600,000 units daily by intramuscular injection for 8 to 12 days. For patients allergic to penicillin, give tetracycline or erythromycin. Tetracycline (Tetracyn®)) should be given in the dosage of 500 mg by mouth four times a day for 15 days. Give erythromycin (Erythrocin®)) in the dosage of 500 mg by mouth four times a day for 15 days to 30 days.

h. **Additional Considerations.**

(1) Be sure the patient understands how important it is to follow the treatment even after all his symptoms have disappeared.

(2) Lesions of secondary syphilis must be kept clean and dry.

(3) Treat symptoms of late syphilis.

(4) Suggest to patients that they have VDRL testing at intervals after beginning therapy to detect a possible relapse. Testing should be once a month for the first 3 months, then the patient should be tested at the 6th month, 12th month, and the 24th month.

(5) Suggest strongly that patients with syphilis tell their sexual partners of the infection so that these partners can also be tested and treated. (This may be required by state law.)

2-8. HERPES SIMPLEX

Herpes simplex is a recurrent viral infection which is caused by Herpesvirus hominis (HVH). There are two types of herpes simplex: Herpes Type I and Herpes Type II. Herpes Type I is transmitted by oral and respiratory secretions and affects the skin and mucous membranes. This type of herpes virus commonly causes cold sores and fever blisters. Herpes Type II, the virus to be dealt with in this lesson, primarily affects the genital area. This virus is transmitted by sexual contact. About 40 million Americans have herpes type II (also known as genital herpes). It is estimated that 500,000 new cases of genital herpes occur each year. Herpes type II reached epidemic proportions in the 1980's but was overshadowed by media publicity concerning AIDS. When vesicles occur on the genitalia, the condition is known as herpes progenitalis.

a. **Etiology.** Herpes simplex is an acute viral infection which may reoccur in the same location for years. Research indicates that the herpes virus may persist in the nuclei of nerve cells in the sensory ganglia. Ordinarily, this virus is transmitted venereally. An outbreak of the virus may occur in the same location when provoked by the following:

(1) Fever.

(2) Sunburn, wind burn.

(3) Physical or nervous stress.

(4) Fatigue.

(5) Menstruation.

(6) Certain foods or drugs.

b. **Epidemiology.** Herpes Types II is moderately contagious. It is now the most common cause of genital ulceration in both females and males. A Herpes Type II lesion frequently appears four to seven days after exposure.

c. **Signs and Symptoms.** Included are the following:

(1) Itch and soreness usually takes place before a small patch of erythema on the skin or mucous membranes appears.

(2) A small group of vesicles develop vesicles which become eroded. The result is a group of superficial, circular ulcers with red areola.

(3) Inguinal lymphatic nodes become enlarged an tender.

(4) Burning sensation in the area of the vesicles/ulcers.

(5) Ulcers are painful.

(6) A feeling of generalize malaise.

(7) Difficulty while urinating or walking.

(8) Lesions on males are found on the prepuce, glans penis, and shaft of the penis.

(9) Lesions on females are found on the labia, clitoris, perineum, vagina, and cervix.

d. **Treatment.** There is no known cure for Herpes Type II viruses. Some agents have had varied degrees of success. These agents are all experimental, and some are considered carcinogenic (a cancer-producing agent). Future research is aimed at controlling the herpes simplex virus by the body's own immune system.

2-9. VENEREAL WARTS

Venereal warts (also known as Condylomata acuminata) are warts that grow on or near the genitals and around the anus. These warts were previously thought to more of a nuisance than a health problem. Research indicates that the virus which causes venereal warts may be associated on a long-term basis with the development of cervical cancer in women and other genital cancers in both sexes. Venereal warts exist with other sexually transmitted diseases. An individual with such warts, therefore, should have a thorough medical evaluation to check for organisms such as N. gonorrhea or C. trachomatis.

a. **Etiology.** Venereal warts are caused by a sexually transmitted virus called the human papilloma virus (HPV). These warts grow rapidly in the presence of heavy perspiration, pregnancy, or poor hygiene. As mentioned in the previous paragraph, venereal warts often accompany another genital infection.

b. **Signs/Symptoms.** The warts are soft, moist, pink, or red tiny swellings. (They are sometimes grayish-white). These warts have a cauliflower-like surface and grow rapidly. The warts have a tendency to become pedunculated (have a stem-like structure serving as a support or attachment). When several venereal warts are in the same area, they have a cauliflower-like appearance.

c. **Diagnosis.** Examination reveals that the wart appearance is different from the flat-topped condylomata lata (secondary syphilis). Examination of dark-field scrapings of the wart cells shows that they have marked vascularization of epidermal cells (not characteristic of condylomata lata. A biopsy should be taken to rule out cancer.

d. **Treatment.** Treat as follows:

(1) Small warts may be removed by a topical drug therapy of 20 percent podophyllum in tincture of benzoin or trichloroacetic acid, either of which may remove small warts.

(2) Warts may also be removed by applying 25 percent podophyllum in spirits. Allow the medication to dry. Wash the medication off after three to four hours. Repeat application of the medication once or twice a week. If the wart is not gone after one month, consider an alternative method of treatment. When treating warts, take care to:

(a) Avoid damaging the surrounding tissue.

(b) Avoid large areas being treated at one time.

(c) Avoid contact with eyes.

CAUTION: Use extreme caution with pregnant women. Systemic toxicity and fetal death have occurred after intervaginal application in pregnant women.

(d) Wash off the treated area 3 to 4 hours after each application. With subsequent applications, you may wait up to 12 hours to wash off the treated area.

(3) If the warts do not respond to podophyllum, remove the venereal warts by electrocauterization.

(4) Extensive lesions may require surgical excision and even partial penile amputation.

(5) Circumcision may prevent recurrence of venereal warts in males. Relapse in males and females is frequent.

e. **Additional Considerations.**

(1) Advise the patient to avoid sex with an infected partner.

(2) Suggest the patient wash the genitalia regularly with soap and water.

(3) Female patients should avoid feminine hygiene sprays, frequent douching, tight pants, nylon underpants, or panty hose to prevent vaginal infection.

2-10. CHANCROID

Chancroid may be defined as a venereal disease characterized by painful genital ulcers and inguinal adenitis (inflammation of a lymph node or gland). This infection affects males more often then females and occurs worldwide but more often in tropical countries.

a. **Etiology.** The cause of chancroid lesions is Hemophilus ducreyi which is a short, nonmotile, gram-negative streptobacillus. Chancroid lesions are transmitted through sexual contact. Males who are uncircumcised and have poor hygiene are especially at risk.

b. **Signs and Symptoms.** Following a three to five day incubation period, small painful papules may appear. These papules may break down and become shallow ulcers with ragged undermined edges. The papules usually appear on the groin or inner thigh. In the male, a papule may appear on the penis. Papules on the female may appear on the vulva, the vagina, or the cervix. Sometimes, papules may erupt on the tongue, lip, breast, or navel. The lesions develop as follows:

(1) Ulcers are shallow, nonindurated (soft), and painful. They are surrounded by a reddish border. The ulcers vary in size and often grow together.

(2) Within two to three weeks in up to 50 percent of patients, the inguinal lymphatic nodes become tender, enlarge, and matted together. These lymph nodes form a fluctuant abscess (bubo) in the groin (the lymph nodes turn into large ulcers).

(3) The skin over the abscess is red and shiny. This skin may break down forming a sinus (body cavity).

(4) Autoinoculation (spread of infection from one part of the body to another part) may form from new locations.

c. **Treatment.** Chancroids may heal by themselves. If this does not happen, chancroidal lesions usually respond to treatment very well. Treat as follows:

(1) Give sulfisoxazole (Gantrisin®)) in the dosage of 1 gm, 4 times a day for 10 to 14 days.

(2) OR TCN Tetracycline, (Tetracyn®)) 500 mg, four times a day for 10 to 14 days.

(3) Serologic tests for syphilis (STS) monthly for three months.

(4) Aspirate buboes (enlarged or inflamed lymph nodes) that are filled with fluid to prevent the spread of infection.

d. **Additional Considerations.**

(1) The patient should not apply creams, lotions, or oils on or near the genitalia or on other lesion sites. These could spread the infection.

(2) To help prevent a recurrence of chancroid infection, tell patients to:

(a) Avoid sexual contact with persons who have chancroid infections.

(b) Be sure condoms are used during sexual activity.

(c) Wash the genitalia with soap and water after sexual activity.

2-11. GRANULOMA INGUINALE (DONOVANOSIS)

This is a chronic disease marked by granulomatous ulcerations in the inguinal region and the genitalia. This infection is mildly contagious and chronic. It is most prevalent in tropical and subtropical areas.

a. **Etiology.** The cause of the infection is calymmatobacterium (Donovania) granulomatis. This is a gram-negative rod-shaped bacillus which maybe related to Klebsiella. Granuloma inguinale is a progressive disease of the skin and the mucous membranes.

b. **Signs and Symptoms.** The incubation period ranges from 8 days to 12 weeks. Most papules, however, appear within 30 days. First, a papule forms which ulcerates and develops into a relatively painless, elevated zone of clean beefy red friable granulation tissue. The edges are irregular, and the disease spreads by autoinoculation. On the male, lesions are located on the penis and the perianal area. On the female, lesions are located on the vulva, vagina, and perineum.

c. **Treatment.** The most important treatment other than antibiotic therapy is good hygiene. Antibiotic therapy includes TCN tetracycline (Tetracyn®)) in the dosage of 500 mg four times a day for 15 days by mouth or streptomycin, 1 gram IM every six hours for five days.

2-12. COMMON MYTHS ABOUT SEXUALLY TRANSMITTED DISEASES

Humans have been afflicted with sexually transmitted diseases since the beginning of time. Passages in the Bible and in ancient religious books refer to sexually transmitted disease. With greater sexual freedom and activity in the last thirty years, new types of sexually transmitted diseases have been identified. Everyone needs to be informed about previously known STDs such as syphilis and gonorrhea as well as newly identified diseases such as chlamydia and trichomoniasis. As people endeavor to learn about the diseases, some incorrect information is exchanged. Look at the following myths about sexually transmitted diseases; then, examine the facts.

a. MYTH: Sexually transmitted diseases can be spread by an individual touching a toilet seat, door knobs, or sitting in a hot tub.

   FACT: No. Sexually transmitted diseases are almost always spread through direct sexual contact.

b. MYTH: Gonorrhea can turn into syphilis.

   FACT: Syphilis and gonorrhea are two kinds of sexually transmitted disease. One of these diseases does NOT turn into the other disease.

c. MYTH: A person always knows when he has a sexually transmitted disease.

   FACT: The truth is that the signs/symptoms of some STDs do not become evident until the disease is very serious. So it is possible to have an STD and not know that you have the disease.

d. MYTH: Having a sexually transmitted disease once makes a person immune to the disease; that is, he can never get that disease again.

FACT: Wrong. There is no immunity to sexually transmitted diseases. An STD can infect the same person again and again.

e. MYTH: An individual cannot get a sexually transmitted disease unless he has intercourse with an infected person.

FACT: Wrong. If you have intimate contact (not necessarily sexual intercourse) with a person infected with an STD, you may become infected.

f. MYTH: Gonorrhea is caused by strain; for example, lifting a heavy object.

FACT: No. A person does NOT get gonorrhea by lifting a heavy object or straining.

g. MYTH: You can look at a person and tell whether or not he has a sexually transmitted disease.

FACT: Wrong. A medical examination and laboratory tests are required to confirm the presence or absence of venereal disease.

h. MYTH: Syphilis is hereditary.

FACT: Syphilis CANNOT be inherited. A pregnant woman can, however, transmit the disease to her unborn child as the child is developing.

Section III. LABORATORY TESTS AND PROCEDURES

2-13. TEST/PROCEDURES FOR GONORRHEA

a. Obtain a Gram's stain smear and culture. In males, a thin cotton-tipped swab is inserted into the urethra to get a discharge smear. In females, an endocervical smear is taken and examined. A part of the specimen is smeared on a microscopic slide and stained with Gram's stain. If the organisms stain purple, the result is gram-positive. An infection exists, in this case gonorrhea. If the organisms stain pink, the result is gram-negative, and there is no infection. It usually takes about an hour to obtain the results of a Gram's stain smear. Since the result of a culture takes from two to five days, a Gram's stain is often performed so that treatment can be started sooner.

b. Request a blood test to rule out syphilis. Do this before treatment and after treatment.

c. Transport the specimen collected from the patient to the laboratory immediately. Do NOT refrigerate the specimen.

2-14. TEST/PROCEDURES FOR SYPHILIS

a. **Serologic Tests for Syphilis (STS)**. Over a dozen laboratory tests are available to diagnose syphilis. Following is information about some of these tests.

(1) Venereal disease research laboratory (VDRL). This is the test which is least expensive and most widely used. False positives, however, are common. Some states use the VDRL test (or an equivalent blood test) as a screening test before marriage. Additional conditions which indicate the need for a VDRL test include:

(a) Multiple sexual partners (a practice which increases the risk of getting syphilis).

(b) An undiagnosed genital sore.

(c) Another sexually transmitted disease.

(d) A history of contact with a partner who may have syphilis.

NOTE: If the VDRL test is taken for any of the previous reasons, the test should be repeated again in several weeks to be sure the individual tested did not have an early syphilis infection which was missed.

(2) Rapid plasma region (RPR). Also inexpensive, this test is simple, rapid, and a reliable substitute for the VDRL test.

NOTE: Both the VDRL test and the RPR test are blood tests which can detect antibody-like substances in the blood. Such substances form when a syphilis infection is present. These two tests are inexpensive and easy to perform. There is, however, a major disadvantage in these tests. The tests will NOT detect syphilis in as many as 25 percent of the tested individuals who are in the early stages of the disease. Additionally, many other conditions can produce a false-positive test result. (False-positive means that the individual has tested positive for syphilis but does not have syphilis.)

(3) Fluorescent treponemal antibody (FTA-ABS) test. This is the most sensitive test, and false positives are uncommon. The FTA-ABS test, a more sensitive and more specific blood test for detecting syphilis, is usually used to confirm the presence of syphilis when either the VDRL or RPR result is positive. Even the FTA-ABS test may not reveal a syphilis infection until three or more weeks after the disease has begun.

b. **Other Tests.**

(1) Dark-field examination. This test can be performed when sores are present. Fluid from these sores is taken and examined on a dark field under a microscope. Such an examination may reveal the characteristic spiral-shaped organisms that cause syphilis.

(2) Cerebrospinal-fluid analysis. The VDRL and the FTA-ABS tests are usually performed on a blood sample. These tests may be performed on a sample of cerebrospinal fluid obtained by a lumbar tap to diagnose the spread of late syphilis to the nervous system.

Section IV. THE CONTACT INTERVIEW

2-15. INITIAL CONTACT

The overall goal is to locate, examine, interview, and treat all infecters. To do this, establish rapport with the patient. Make him feel as relaxed and comfortable as possible. Verify data on the patient's medical chart: name, address, and phone number. Establish the patient's willingness to answer direct questions. Then, obtain this information:

a. Who is the patient having sexual relationships with?

b. What is the patient's occupation?

c. What is his marital status? Number of children?

d. Any other helpful locating information?

2-16. GIVING INFORMATION TO/RECEIVING INFORMATION FROM THE PATIENT

a. **Educational Information to the Patient.** The number of cases of sexually transmitted diseases has increased greatly in recent years because the patterns of sexual behavior among people changed. It is important for everyone to be informed about STDs with facts. For example, sexually transmitted diseases thrive when in contact with a warm moist environment such as mucous membranes but die in harsh environments such as a counter top. For each patient who is treated for an STD, there are usually one or more sexual contacts who require diagnosis and treatment. To achieve the goal of preventing/controlling the transmission of STDs, individuals must have facts about transmission and treatment of these diseases.

b. **Information From the Patient.** Obtain this information from the patient.

(1) Ask when was the last time the patient had a venereal disease.

(2) Ask when the patient last had a serologic test for syphilis and the results of that test.

(3) Request a list of the patient's sexual contacts.

(4) Ask for address, phone number, place of employment, and any other pertinent information regarding these sexual contacts. Get complete locating information. Refer to these contacts without references to gender.

2-17. MOTIVATION FOR THE CONTACT INTERVIEW

a. Stress the spread of the disease and possible reinfection. There are carriers of sexually transmitted diseases who appear healthy but who do spread sexually transmitted diseases.

b. Stress the course of gonorrhea and syphilis in men and women and the late manifestations of these diseases.

c. Explain congenital transmission. (Be very careful at this point if the patient is a pregnant female.)

2-18. PREVENTION OF SEXUALLY TRANSMITTED DISEASES (SIDs)

Follow these guidelines to reduce your chance of contracting a sexually transmitted disease and to prevent spreading that disease if you do contract it.

a. **Be Informed.** Know the signs and symptoms of sexually transmitted diseases. You can then refrain from sex with a partner showing any signs/symptoms of SIDs. Additionally, if you see such signs/symptoms in yourself, you can seek medical treatment at once.

b. **Be Observant.** Look at yourself and your sexual partner. If either of you has a sore or blister, the infected person should not have sex but seek medical treatment.

c. **Be Selective.** The more sex partners you have, the greater chance you have of becoming infected with a sexually transmitted disease. Sex with someone you do not know is also hazardous. Select your sexual partner carefully.

d. **Be Honest.** Tell those with whom you have had sex recently if you are diagnosed as having STD. This allows your partner to watch for symptoms and/or to be tested.

e. **Be Careful.** Use a condom to reduce the chances of being infected with a sexually transmitted disease. Follow these common sense rules regarding condoms:

(1) Use latex condoms only. Condoms made of animal-membrane have pores which allow at least the HIV to pass through.

(2) Store condoms in a cool, dry place, out of direct sunlight. A condom stored in a wallet may be torn, damaged, or old after a while. Condoms are usually good for only two years after the date of manufacture.

(3) Do not reuse condoms.

f. **Be Tested and Treated Promptly, if Necessary.** Seek medical treatment quickly if you develop signs or symptoms of a sexually transmitted disease or if a sexual partner has a STD that makes it likely that you are also infected. Prompt treatment will restore you to good health faster and prevent you from having the serious complications of many sexually transmitted diseases.

2-19. CLOSING STATEMENT

The only unique feature of these diseases is their mode of transmission. In fact, if syphilis were transmitted by mosquito bites, it could perhaps, have been eradicated decades ago. But, since these diseases are transmitted by sexual intercourse, and sex is a highly charged area, we have much more difficulty in control. The situation is not hopeless, however, and with vigorous efforts toward prevention, these diseases can be conquered.

Table of Venereal Diseases

Disease	Etiologic Agent	Chief Clinical Manifestations	Complications	Lab Diagnosis
Chancroid	*Hemophilus ducrayl*	One or more painful, soft-edge chancres and frequent, painful itching; adenopathy	Slow healing, chronic node drainage	Gram's stain
Herpes progenitalis	*Herpes virus hominis* Type II	Usually multiple vesicular lesions, many broken & crusting, painful	Bacterial - super-infection slow healing	By exclusion
Primary Syphilis VDRL/STS	*Treponema pallidum*	Usually single, painless chancre with red, indurated margin	Secondary and tertiary lues	Darkfield
Lymphogranuloma Venereum (LGV)	*Chlamydia trichomatis*	Shallow, painless, chancre, may go unnoticed until regional adenopathy develops	Slow-healing, chronic node drainage	Frei test
Granuloma inguinale stain	*Donovania granulomatis*	Usually single, rough, red chancre, painless, with inguinal adenopathy	Regional node drainage, arthritis	Wright's
Gonorrhea (clap, dose)	*Neisseria gonorrhea*	Dysuria, urgency, grossly purulent urethral discharge	Prostatitis, salpingitis, strictures, bacteremia, conjunctivitis	Gram's stain, culture

Table 2-1. Venereal diseases (continued).

Disease	Etiologic Agent	Chief Clinical Manifestations	Complications	Lab Diagnosis
Non-Gonoccol Urethritis (NGU or NSU)	Chlamydia trichomatis, Trichomonas vaginalis, C. albicans, T-mycoplasma hominis, Herpes virus hominis Type II	Mild, often scant & intermittent discharge, hematuria, pelvic pain dysparenunia, pruritis, may have mucopurulent discharge in copious amounts	Prostatis, conjunctivitis, PID	Wet mount, KOH, culture exclusion
Verruca acuminata (warts)	Papovavirus	Painless, moist, papillary lesions primarily of genital mucous membranes	Maceration & infection, obstruction of vagina	None. By PE only
Molluscum contagiosum	MC virus	Pinkish-gray, umbilicated papules, range in size from 1 mm to 1 cm in diam., on external genitalia & thigh	Superinfection from excoriations	None. By PE only
Pediculosis pubis	Phthirus pubis	Pruritis, crusting excoriations, visible adult and larval forms	Superinfection from excoriations	By PE with bright light, magnifying lens

Table 2-1. Venereal diseases (concluded).

Continue with Exercises

EXERCISES, LESSON 2

INSTRUCTIONS: Answer the following exercises by marking the lettered response that best answers the question or best completes the incomplete statement or by writing the answer in the space provided.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced with the solution.

1. The organisms that cause sexually transmitted diseases flourish when in contact with _____.

2. List five of the most common of the sexually transmitted diseases.

   a. _____.

   b. _____.

   c. _____.

   d. _____.

   e. _____.

3. Gonorrhea is also known as:

   a. _____.

   b. _____.

   c. _____.

   d. _____.

   e. _____.

   f. _____.

   g. _____.

4. A male infected with gonorrhea may develop dysuria and _____ discharge.

5. Treatment for uncomplicated gonorrhea includes antibiotic therapy, _____ _____, male restraint, follow-up culture following completed treatment, and retreatment, if necessary.

6. List four early complications of gonorrhea in males.

   a. _____.

   b. _____.

   c. _____.

   d. _____.

7. Nonspecific genital infections (nonspecific urethritis, nonspecific gonococcal urethritis, and nonspecific sexually transmitted infection) are grouped together because _____ _____

8. A chronic, infectious, venereal disease which begins in the mucous membranes and quickly enters the systems of the body, spreading to the lymph nodes nearby and into the blood stream is _____.

9. The two major classifications for syphilis are acquired syphilis and _____ syphilis.

10. List the four stages of syphilis.

    a. _____.

    b. _____.

    c. _____.

    d. _____.

11. Iritis (inflammation of the iris), osteitis (inflammation of the bone), and alopecia (hair loss) are signs of the venereal disease _____.

12. The treatment of choice for syphilis is the beginning stages of the disease is _____

13. Herpes Type II is a recurrent viral infection that is transmitted by _____ _____.

14. What is the cure for Herpes Type II virus? _____ _____

15. Another name for venereal warts is _____.

16. To remove venereal warts, apply 25 percent _____ in spirits on alternate days until the warts disappear.

17. _____ is a venereal disease in which there are painful genital ulcers and inguinal adenitis.

18. _____ is a chronic disease marked by granulomatous ulcerations in the inguinal region and the genitalia.

19. List two ways of determining if the patient has gonorrhea.

a. _____.

b. _____.

20. List three serologic tests to determine if the patient has syphilis.

a. _____.

b. _____.

c. _____.

21. Give three reasons why the contact interview is important.

a. _____.

b. _____.

c. _____.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 2

1. Mucous membranes. (para 2-2b)

2. You are correct if you listed any five of the following:

   Gonorrhea.
   Syphilis.
   Condyloma.
   Chlamydial genital infections.
   Herpes-virus genital infections.
   Trichomoniasis.
   Chancroid.
   Granuloma inguinale.
   Scabies.
   Lice.

   (paras 2-2c(1) through (10)

3. Clap.
   The drip.
   Dose.
   Gleet.
   GC.
   Strain.
   Running. (para 2-4)

4. Purulent. (para 2-4b(1)(a))

5. Sexual abstinence. (paras 2-4d(1) through (5))

6. Prostatitis.
   Cystitis.
   Epididymitis.
   Proctitis. (paras 2-4e(1)(a) through (d))

7. They have similar manifestations (signs and symptoms). (para 2-5)

8. Syphilis. (para 2-7)

9. Acquired. (para 2-7b)

10. a. Primary stage.
    b. Secondary stage.
    c. Latent stage
    d. Tertiary stage. (para 2-7c(1))

11. Syphilis. (para 2-7d(2))

12. One injection of penicillin. (para 2-7g(1))

13. Sexual contact. (para 2-8)

14. There is no cure. Research into a cure continues. (para 2-8d)

15. Condylomata acuminata. (para 2-9)

16. Podophyllum. (para 2-9d(2))

17. Chancroid. (para 2-10)

18. Granuloma inguinale (para 2-11)

19. Grams stain.
Blood test. (paras 2-13a, b)

20. Venereal disease research laboratory (VDRL).
Rapid plasma region (RPR).
Fluorescent treponemal antibody (FTA-ABS) test. (para 2-14)

21. Stress the spread of the disease and possible reinfection tothe patient.
Stress the course of gonorrhea and syphilis in man and the late signs/symptoms of these diseases.
Explain congenital transmission. (paras 2-17a through c)

End of Lesson 2

LESSON ASSIGNMENT

LESSON 3	Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome
LESSON ASSIGNMENT	Paragraphs 3-1 through 3-14.
LESSON OBJECTIVES	After completing this lesson, you will be able to:

3-1. Select the ways in which the human immunodeficiency virus (HIV) can be transmitted.

3-2. Identify the types of individuals who may be considered "high risk" to contract the human immunodeficiency virus (HIV).

3-3. List precautions health care workers should take when caring for patients with human immunodeficiency virus (HIV) infections.

SUGGESTIONS After completing the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 3

HUMAN IMMUNODEFICIENCY VIRUS AND ACQUIRED IMMUNE DEFICIENCY SYNDROME

3-1. INTRODUCTION

In March 1985, there were more than 17,000 reported acquired immune deficiency syndrom (AIDS) cases in the United States. By May 1987, there had been more than 35,000 reported AIDS cases in the U.S. with more than 20,000 AIDS deaths recorded. It is estimated that by the end of 1991, AIDS cases will number 270,000 with AIDS deaths numbering 179,000. Currently, cases of AIDS-related complex (ARC), those with AIDS-related symptoms but not the active disease, do not have to be reported to a health authority. Because of this fact, it is estimated that perhaps 10 times the number of people with AIDS may have AIDS-Related Complex (ARC). AIDS has become a disease of epidemic proportions. Of the many things you should learn about this disease are these facts:

a. The human immunodeficiency virus (HIV) is NOT the same as AIDS.

b. People who have tested positive for HIV can, but do not always, develop AIDS.

3-2. TERMINOLOGY

The acquired immune deficiency syndrome AIDS is a disease in which the patient's immune system has been so weakened that a second unrelated disease produces the symptoms which may result in death. To understand this problem, become familiar with the definition of these terms.

a. **Human Immunodeficiency Virus (HIV).** HIV is a virus which infects certain types of white blood cells called the T-helper cells (T4 cells). The T-helper cells regulate our immune system and protect us from various infectious agents.

b. **Acquired Immune Deficiency Syndrome (AIDS).** AIDS, a diagnostic category created by the Centers for Disease Control (CDC), is a term used to identify HIV-infected persons with life-threatening symptoms. CDC also terms such people as having "CDC-defined AIDS" or "full-blown" AIDS. The most harmful result of HIV infections is AIDS. AIDS is a disease at least moderately predictive of a defect in the body's immune system; this disease can occur in a person with no known cause for diminished resistance to that disease.

c. **AIDS-Related Complex (ARC).** HIV infection in some people leads to an illness in which the patient develops some of the nonspecific symptoms of AIDS but not the typical opportunistic infections. This illness is sometimes mistakenly labeled pre-AIDS. The illness may progress to AIDS.

d. **Opportunistic Infections.** These are infections caused by organisms that do not ordinarily cause disease because the body's immune system successfully fights the organism. A weakened immune system, typical of the AIDS patient, cannot fight off the organism, and the organism infects the person.

NOTE: The Centers for Disease Control defined AIDS in 1981 as a syndrome characterized by unusual opportunistic infections and rare malignancies in otherwise healthy individuals with no other reason for immune system compromise. This definition helped public health officials monitor the fast growing AIDS epidemic even though its cause was unknown. Research to date indicates that AIDS is caused by a human retrovirus.

3-3. BACKGROUND

a. No one is absolutely certain how AIDS originated, but many scientists believe that it began in central Africa. One theory is that the AIDS virus first infected monkey colonies in central Africa and then spread to humans in Africa in the mid-1970's. Scientists hypothesize that the virus was transmitted to humans by a Green Monkey scratch or bite. From Africa, the AIDS virus may have been carried across the Atlantic Ocean by Haitians who once lived in or visited central Africa. The spread of AIDS from Haiti may have occurred in two ways: first, by Haitian immigrants and second, by vacationing American homosexual males, who often traveled to Haiti. In the U.S., AIDS was first seen as pneumonia of a rare type in primarily, but not limited to, homosexual men.

b. The AIDS virus did not suddenly arrive in its present deadly state as a completely new virus. Research indicates that this virus is the result of a different virus which has gone through some changes. Originally, there was either a disease-causing human virus with a different capability or a virus in some animal reservoir. Virologists believe that this virus changed and developed in some isolated primate stock in an isolated area where animal and human populations are scattered and remote. (Of possible areas, central Africa is most plausible because the first documented cases of AIDS were either Africans or individuals with some connection to central Africa.) A logical conclusion is that, over a period of time the original virus went through several changes to become the deadly AIDS virus (HIV) we know today.

3-4. TRANSMISSION OF HIV

There is no current evidence that HIV can be transmitted through casual contact. Routes of transmission include the following:

a. **Sexual Contact**. HIV can be transmitted by direct contact of genital or rectal mucosa with infected semen or vaginal secretions. HIV can be found in many body fluids--saliva, tears, semen, vaginal and cervical secretions. It is believed that the virus is transmitted by fluid only through semen and vaginal and cervical secretions. Additionally, that fluid contact must be direct regardless of whether the contact is homosexual or heterosexual.

b. **Sharing Needles**. The second largest group of people to have AIDS in the United States and Europe are intravenous (IV) drug users. HIV is transmitted through sharing drug injection equipment--needles and syringes--contaminated with infected blood.

c. **Contaminated Blood**. Several known viruses including hepatitis B virus and Epstein-Barr virus can be transmitted in blood products. In 1982, it was discovered that HIV could be transmitted in blood transfusions. Blood products are now screened for HIV with the result that fewer cases of AIDS can be attributed to donated blood products.

d. **Maternal-Child Transmission in Utero**. A pregnant female infected with HIV can transmit the infection during pregnancy, labor, and delivery. It is not known exactly what determines whether the infant will have AIDS since not every infant born to an HIV-infected female develops AIDS.

e. **Casual Contact**. There is no current evidence that the virus can be transmitted by casual contact. Scientific studies have concluded HIV, although deadly when transmitted as just stated, is not transmitted by saliva sprayed in a cough or a sneeze or left on a drinking glass. Tears, urine, and insect bites are not routes of transmission. Research indicates that HIV is a fragile virus that can be killed by heat, ordinary soap and water, household bleach solutions, alcohol, hydrogen peroxide, Lysol, and the chlorine used in swimming pools.

f. **Workplace Safety**. According to the Public Health Service, AIDS is a blood-borne that is not spread by casual contact. No known risk of transmission to co-workers, clients, or consumers exists from HIV infected workers in offices, schools, factories, or construction sites. The Public Health Service recommends that workers known to be infected with HIV should not be restricted from using telephones, office equipment, toilets, showers, eating facilities, or water fountains.

3-5. ACTION OF A VIRUS ON A CELL

A variety of microorganisms are present in our environment. Some of these are harmful--bacteria, fungi, rickettsiae, protozoans, helminthes, and viruses--and can cause disease in a susceptible person. AIDS is caused by a virus called the human immunodeficiency virus (HIV).

a. **Viruses.** A virus can be defined as a piece of free-floating genetic material which is surrounded by a protective protein coating called a capsid. Not a cell and not alive, a virus is a subcellular microorganism whose duty is to replicate (reduplicate, duplicate).

(1) When a virus enters the body, it finds a host cell. Once the virus selects a cell, the virus can pierce the cell membrane with a "spike" which is in the capsid of the virus or the virus can use an enzyme to break down the cell membrane and enter the cell. Inside the cell, the virus uses the cell's machinery to replicate itself. The cell will die either from the duplication process or when the new viral particles leave the cell. On the other hand, sometimes the virus will become dormant (do nothing) when it enters a cell.

(2) After a virus enters a cell (infection), the body's primary immune response will go into action. B cells and T cells collect at the site of the infection to fight the virus. Antibodies to this particular virus are produced by the B cells. T cells have antibodies in their cell membranes. T cells will determine the type of virus. The particular T cell which can fight this virus will become active, increasing in size and multiplying. This killer T cell will rush to the cell with the virus and secrete substances that render the viral cell harmless. (Thousands of different types of T cells exist in the body; each type of T cell can fight a specific infection.)

b. **Action of HIV on Cells.** AIDS is caused by the action of a virus, the human immunodeficiency virus (HIV), on cells in the body. The problem is that the human immunodeficiency virus attacks the very cells that are responsible for killing the virus, the T4 lymphocytes. HIV enters the bloodstream and makes contact with T4 lymphocytes (white blood cells). The invading virus fits onto the cells' receptors. The cell reads the virus as if the virus were part of the cell. At this point, the virus can either become dormant (inactive and just being there), or the virus can become active, changing and multiplying to enter the bloodstream to infect other T4 cells. If this virus is active, it can multiply itself many times, break out of the host T4 cell, killing the cell in the replication process or as the virus leaves. What happens in the body is that T4 cells are either killed or weakened. Since the T4 cells are of great importance in the body's immune system, eventually after the major portion of these cells is killed, the body's immune system is weakened or useless. Then the patient becomes susceptible to <u>opportunistic infections</u> and <u>unusual cancers</u>. The patient has developed the syndrome called AIDS.

<u>NOTE</u>: A dormant virus in a cell may become active at any time.

3-6. SIGNS AND SYMPTOMS OF HIV

The person infected with human immunodeficiency virus may have not symptoms at all or symptoms of AIDS. Most people infected with this virus have no symptoms and are what is called "healthy carriers."

3-7. SIGNS AND SYMPTOMS OF AIDS

Some people with AIDS have no symptoms and seem healthy until they abruptly develop an opportunistic infection or Kaposi's sarcoma. Other patients have a recent history of nonspecific signs and symptoms. These signs and symptoms are displayed by those with AIDS.

a. Fever of unknown origin. The fever may be low grade and persistent, or it may be episodic and spiking.

b. Weight loss. The patient may lose as much as 20 to 30 percent of his body weight.

c. Malaise.

d. Diarrhea.

e. Opportunistic infections; for example, Candida, Pneumocystis pneumonia, toxoplasmosis, cytomegalovirus.

f. Kaposi's sarcoma. This is a type of cancer, a vascular tumor with brown and purple plaques or nodules. When associated with AIDS, this disease progresses rapidly and may be found in the oral cavity, hard palate, gastrointestinal tract, lymph nodes, and lungs.

3-8. TREATMENT

Currently, there is no cure for the HIV infection and, therefore, no cure for AIDS. Research continues to find methods to stop the growth of the human immunodeficiency virus and to restore the patient's immune system. In the meantime, patients are treated to alleviate signs and symptoms from which they are suffering. Specifically, supportive measures are taken to reduce the risk of the patient developing an infection, to treat any existing infections and malignancies, to maintain adequate nutrition for the patient, and to give the patient emotional support. The drug Zidovudine (formerly called azidothymidine or AZT) was the first drug which slowed down the progression of AIDS. This drug, however, is very toxic. (Patients using the drug in a controlled study required regular blood transfusions to maintain their hemoglobin.) Research must continue to discover an effective treatment for AIDS.

3-9. WALTER REED STAGING CLASSIFICATION

As more knowledge about HIV infection became known, it became apparent that a classification system for the progression of HIV/AIDS was necessary. So far, four classification systems regarding the progression of the HIV infection have been developed. One of those classification systems was developed by the Army at Walter Reed Army Medical Center. This system is called the Walter Reed staging classification for HIV infection. This system is based on current concepts of the immunopathogenesis of AIDS and attempts to provide an objective scale of the progression of the disease (HIV infection to AIDS). The Walter Reed stages are defined according to virologic/serologic evidence of HIV infection, CD4 +T-helper lymphocyte subset depletion, loss of cutaneous delayed hypersensitivity, and appearance of opportunistic infections. One of the strengths of this system is that it provides a useful tool for studying the natural history of "early" HIV infection. This system provides uniformity of clinical evaluation of patients with documentation of HIV infection. Here are the stages of the system:

a. WRO. High risk contacts (sexual contacts or blood recipients of HIV-infected individuals).

b. WR1--WR6. Require documentation of HIV infection by positive Western Blot blood test.

c. WR5. Patient has complete energy or thrush.

d. WR6. Patient has had an opportunistic infection.

3-10. PROBLEMS UNIQUE TO THE MILITARY

The disease AIDS has a special impact on military personnel. Consider the following:

a. **Deployment.** American security depends on a fighting force that is 100 percent physically fit and ready to be deployed whenever and wherever needed. Personnel ill with AIDS will not be able to perform their mission and will also overextend medical support on noncombat-related problems. Suppose a member of a deployed unit is diagnosed as having AIDS. Will other unit members want to be near him? Perhaps not. The result may be undermining individual morale and destruction of unit espirit de corps.

b. **Battlefield Injuries Transfusions.** Military personnel may need transfusions, but the soldiers may be fearful of receiving a blood transfusion from an anonymous donor. There is the possibility that the blood might be contaminated and give him AIDS.

c. **Live Virus Inoculation.** Military personnel require a variety of inoculations to help keep the fighting force physically fit in other parts of the world. Those inoculations are sometimes given with needles and syringes. Couldn't either of those be contaminated? (This is unlikely since usually both needles and syringes come packaged and sterilized, and neither are reused.)

3-11. PREVENTION

Follow these guidelines to reduce the risk of becoming infected with the human immunodeficiency virus and subsequently developing AIDS:

a. Avoid sexual contact with those at risk:

(1) Prostitutes.

(2) Drug users.

(3) Homosexuals.

(4) Bisexuals.

(5) Promiscuous individuals.

NOTE: The use of condoms made of latex has been shown to be an effective barrier against HIV. Condoms made of animal membrane, however, have not provided protection against HIV.

b. Limit the number of sexual partners.

c. Don't use IV drugs.

NOTE: Women who are HIV infected or think they may be HIV infected should be cautioned to avoid pregnancy because they can transmit the virus to their unborn child.

3-12. PSYCHOSOCIAL ASPECTS

At this time, an individual diagnosed as having AIDS faces not only the trauma of having a fatal illness but also the possibility that he will lose his job, family, and friends. The patient needs help in dealing with not only physical problems but also the collapse of his economic and social life. People with AIDS have some common concerns, some of which include the following:

a. **Need for Confidentiality.** As a health care provider, you have a responsibility to keep the knowledge that an individual has AIDS, ARC, or an HIV infection confidential. In the military, do not talk about cases of individuals with any of these infections. You will need to follow standard operating procedures for reporting such information as you come across it in your job. Currently, government policy affecting people with AIDS, ARC and/or HIV infection is as follows:

(1) All military personnel and all recruits are tested for HIV antibodies. Army recruits, ROTC students, service academy cadets, and all candidates for officer service are expelled if found to be infected with HIV. Active duty personnel who test positive for HIV are not separated from the service but are subject to involuntary change and limited duties.

(2) In regard to AIDS, ARC, and/or HIV infection, there is a limited confidentiality. Information a military doctor learns from his military patient may be used against the patient in court-martial proceedings. Care will be taken that only those with a "need to know" are given any information about a soldier's HIV status. For example, the HIV-infected soldier will be advised to inform all previous sexual partners to seek testing and counseling. Information must also be reported to civilian public health authorities.

NOTE: In the civilian community, all states have laws requiring that doctors report the identities of individuals diagnosed with AIDS either to state or local health authorities. For many years, doctors have been required to report other communicable and sexually transmissible diseases. Through the years, \ public health officials have a good record of keeping such information confidential. The purpose of reporting such AIDS information is to help track the progress of the AIDS epidemic.

b. **Feelings of the Patient at the Time of Diagnosis.** Generally, individuals first diagnosed as having AIDS experience these reactions: fear and panic, denial, anger and depression, and helplessness. Most individuals pass through theses phases of feelings in the sequence given here. Naturally, not everyone reacts this way. Let's look at these feelings, since these are the most common reactions.

(1) Fear and panic. Since there is much about this disease that is unknown, it is natural and normal to be afraid and to panic. There have been many horror stories about this disease. Additionally, the prospect is that the disease is fatal. Specific fears may include fear of rejection, fear of being helpless and alone, fear of pain, and, of course, fear of death.

(2) Denial. First, the thoughts are "It can't be me." "Oh, no, not me." That the person could have the disease seems just too horrible to be true.

(3) Anger. AIDS brings out a great deal of anger. First, there is anger about having the disease itself. "Why me?" Then, anger about many things come out. If friends abandon the person, anger at the abandonment. Often, a person feels anger at the government and society for not having found a cure and/or treatment for the disease. Included are angers at health care people for not doing more to help and angers at the tremendous cost for medications that do not cure. Eventually, these and other angers turn inward, and the person feels depressed.

(4) Helplessness. Finally, many feel helpless. Helpless and hopeless seem to go hand in hand. Many individuals just give up.

NOTE: On a positive note, as the AIDS epidemic continues to grow, support systems and positive information also is growing. There are now support groups in several states. Information is available in books, audio tapes, and video tapes.

c. **Potential for Suicide Ideation.** Patients who are terminally ill with AIDS may consider suicide. The pain of associated illnesses, the prospect of repeated hospital stays with no cure, and the sense of being a burden to others are all factors that contribute to the idea of suicide as a way out.

d. **Fears Concerning Development of AIDS and Subsequent Death.** It is natural and normal to worry about how the disease will progress. Will it be painful? Will the person lose his independence? Since the disease is usually fatal and death is full of unknowns, it is also normal to worry about death. The individual patient will eventually come to terms with these concerns himself. In the military, the patient is usually referred to AIDS counselors when initially diagnosed. These counselors work with the patient, referring him to psychologists, ministers, etc. as needed.

3-13. PRECAUTIONS FOR HEALTH CARE WORKERS

Traditionally, health care workers have taken precautions such as hand washing when working with individuals with an infectious disease. With the discovery that health care workers may come in contact with supposedly healthy persons who are carriers of HIV, it now becomes necessary for these workers to take precautions routinely:

a. Wash your hands before and after contact with each patient. Also, wash your hands after exposure to body fluids or laboratory specimens.

b. Wear disposable gloves whenever you have direct contact with potentially infected substances, body tissues, or environmental surfaces.

c. Employees with weeping or exudative skin lesions on the hands or other exposed areas should be excused from direct patient care activities until the condition is healed.

d. Wear gowns or other protective garments if your clothing is likely to be soiled with blood, secretions, or excretions. DO NOT wear soiled gowns outside the patient care area or outside the laboratory areas.

e. Dispose of used needles, scalpels, and other sharp disposable objects in puncture-resistant containers. DO NOT resheath, bend, break, or manipulate such equipment in any way before disposal.

f. It is not necessary to wear masks and protective eye wear routinely. Wear a mask when dealing with a coughing patient suspected of having M. tuberculosis or any other infectious respiratory disease. Wear masks and protective eye wear when you think there may be a splatter of saliva, respiratory secretions, amniotic fluid, blood, or other body fluids. This is to protect you from infected materials.

g. Clean contaminated areas with a solution of 10 percent household bleach; that is, 1 part bleach to 9 parts water.

h. Place contaminated wastes in containers for disposal according to local standing operating procedure. Soiled linens and other laundry should be put in bag clearly marked as contaminated and transported and laundered according to local standing operating procedure.

i. Be sure to label blood products from infectious or possibly infectious patients correctly.

j. Take precautions when drawing blood or starting an IV.

NOTE: The goal is to prevent health care workers from being exposed to potentially infected body fluids and tissues.

3-14. CLOSING

a. To combat the epidemic of immune deficiency disease, general principles of prevention, eradication, and treatment of infection should be used. First, educate the public to prevention procedures so that there are fewer people exposed to the virus and, thus, fewer people infected. Second, research must continue to ward developing a vaccine composed of antigens which would elicit neutralizing antibody formation. (Research on HIV and AIDS has advanced dramatically over the past five years.) Third, ongoing research and development of drugs to treat the infection and restore the body's immune system must be move forward.

b. To facilitate development of scientifically based information on the natural history and transmission pattern of HIV, it is essential that infected soldiers assist the military health care system by providing accurate information. Accordingly, the mere presence of the HIV antibody will not be used as the basis for adverse action against a soldier.

c. Currently, the military research community is continuing to help the civilian sector in the ongoing research concerning the human immunodeficiency virus which causes AIDS. At the present time, the best health measures are preventative in nature. Each of you is charges with the responsibility of properly educating soldiers in your units with the proper information concerning this virus and the preventative measures that can be taken.

Continue with Exercises

EXERCISES, LESSON 3

INSTRUCTIONS: Answer the following exercises by marking the lettered response that best answers the question or best completes the incomplete statement or by writing the answer in the space provided.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced with the solution.

1. The letters HIV stand for _____.

2. HIV may be defined as _____

   _____

3. The letters AIDS stand for _____.

4. AIDS may be defined as _____

   _____

5. List the four routes of transmission of HIV.

   a. _____.

   b. _____.

   c. _____.

   d. _____.

6. AIDS is caused by the action of a virus (HIV) on the body's _____

7. The result of the action in test item #6 is that the body's _____ system is weakened or becomes useless, and the patient becomes susceptible to _____infections and unusual _____.

8. List four signs/symptoms of AIDS.

   a. _____.

   b. _____.

   c. _____.

   d. _____.

9. The system developed at Walter Reed which attempts to provide an objective scale of the progression of HIV infection to AIDS is called the _____

   _____

10. List five groups of individuals who are high-risk for developing AIDS:

    a. _____.

    b. _____.

    c. _____.

    d. _____.

    e. _____.

11. List three methods of reducing the risk of developing AIDS.

    a. _____.

    b. _____.

    c. _____.

12. A patient just diagnosed as having AIDS may go through these psychological phases:

a. _____.

b. _____.

c. _____.

d. _____.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 3

1. Human immunodeficiency virus. (3-2a)

2. HIV is a virus that attacks T-helper cells, cells which regulate our immune system and protect us from various infectious agents. (para 3-2a)

3. Acquired immune deficiency syndrome. (para 3-2b)

4. AIDS is a disease that occurs in a person with no known cause for diminished resistance to that disease. (para 3-2b)

5. Sexual contact.
   Sharing of needles.
   Contaminated blood.
   Maternal-child transmission in utero. (paras 3-4a(1) through (4))

6. T4 cells. (para 3-5b)

7. Immune.
   Opportunistic.
   Cancers. (para 3-5b)

8. You are correct if you listed any four of the following:

   Fever of unknown origin.
   Malaise.
   Opportunistic infections.
   Weight loss.
   Diarrhea.
   Kaposi's sarcoma.
   (paras 3-7a through f)

9. Walter Reed Staging Classification System. (para 3-9)

10. Prostitutes.
    Drug users.
    Homosexuals.
    Bisexuals.
    Promiscuous individuals. (paras 3-11a(1) through (5))

11. Avoid sexual contact with those at risk.
    Limit the number of sexual partners.
    Don't use IV drugs. (paras 3-11a through c)

12. Fear and panic.
    Denial.
    Anger.
    Helplessness. (paras 3-12b(1) through (4))

End of Lesson 3

LESSON ASSIGNMENT

LESSON 4	Diuretics.
LESSON ASSIGNMENT	Paragraphs 4-1 through 4-6.
LESSON OBJECTIVES	After completing this lesson, you will be able to:

4-1. Identify the general characteristics of diuretics.

4-2. Identify the types of diuretics.

4-3. Identify the location of action for specific diuretics.

4-4. Identify the indications/contraindications for use of specific diuretics.

4-5. Identify the routes of administration for specific diuretics.

4-6. Select the proper dosage for a specific diuretic.

SUGGESTIONS After completing the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 4

DIURETICS

4-1. INTRODUCTION

As the turn of the century, one of the primary drugs used in the treatment of syphilis was mercury. Although the mercury had little, if any, effect on the syphilis, it did produce a wide assortment of side effects including an increase in urine output. This observation of elevated urine output following the administration of mercury stimulated a great deal of research into safer and more effective diuretic agents. As a result, today we possess a wide range of agents capable of stimulating urine output in a variety of clinical situations. Several of these agents are available to the Medical NCO Specialist in the field. Because of the potential dangers with diuretics, it is imperative that you know how to handle and administer these agents properly.

4-2. DEFINITION OF TERMS

To understand the nature and actions of diuretics, it is essential to understand these terms.

a. Diuresis--a condition characterized by increased urine production and increased urine output.

b. Diuretics--agents that increase urine output. In other words, diuretic agents cause diuresis.

4-3. STRUCTURE AND FUNCTION OF THE KIDNEY

The kidneys are organs of the urinary system which includes the ureters, the urinary bladder, and the urethra. The kidneys are important organs in the operation of the urinary system. The functions of this system include elimination of some of the body's soluble waste products and the regulation of water and electrolyte balance.

a. **Structure of the Kidney.**

(1) Location. The kidneys, reddish organs that are shaped like kidney beans, are located just above the waist between the parietal peritoneum and the posterior wall of the abdomen. In relation to the vertebral column, the kidneys are located between the last thoracic and the third lumbar vertebrae. The eleventh and twelfth pairs of ribs partly protect the kidneys. Because liver is a large organ which takes up space on the right side of the body, the right kidney is a little lower than the left kidney.

(2) Structure. A coronal (frontal) section of the internal anatomy of the kidney is called the cortex. The inner, reddish-brown region of the kidneys is called the medulla. Eight to 18 striated, triangular structure termed renal pyramids are located in the medulla. The characteristic tissue of the kidneys is made up of the cortex and the renal pyramids. Tissue in each kidney is made up of about 1 million microscopic units called nephrons, collecting ducts, and their associated vascular supply. The working units of each kidney are the nephrons which help regulate the composition of blood and the formation of urine.

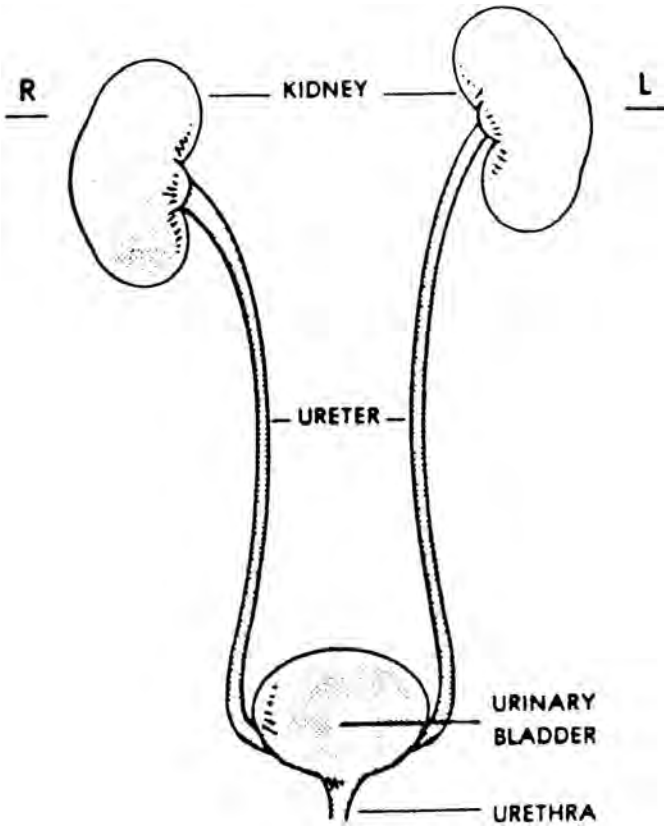

Figure 4-1. The kidneys.

b. **The Nephron Unit.** The nephron is the functional unit of the kidney. The estimation is that each kidney has about a million nephron units. A nephron is a long tubular structure made up of successive segments of different structure and transport functions. A nephron unit includes the following: renal corpuscle (Bowman's capsule and the glomerulus), proximal tubule, Henle's Loop, distal tubule, and collecting duct system.

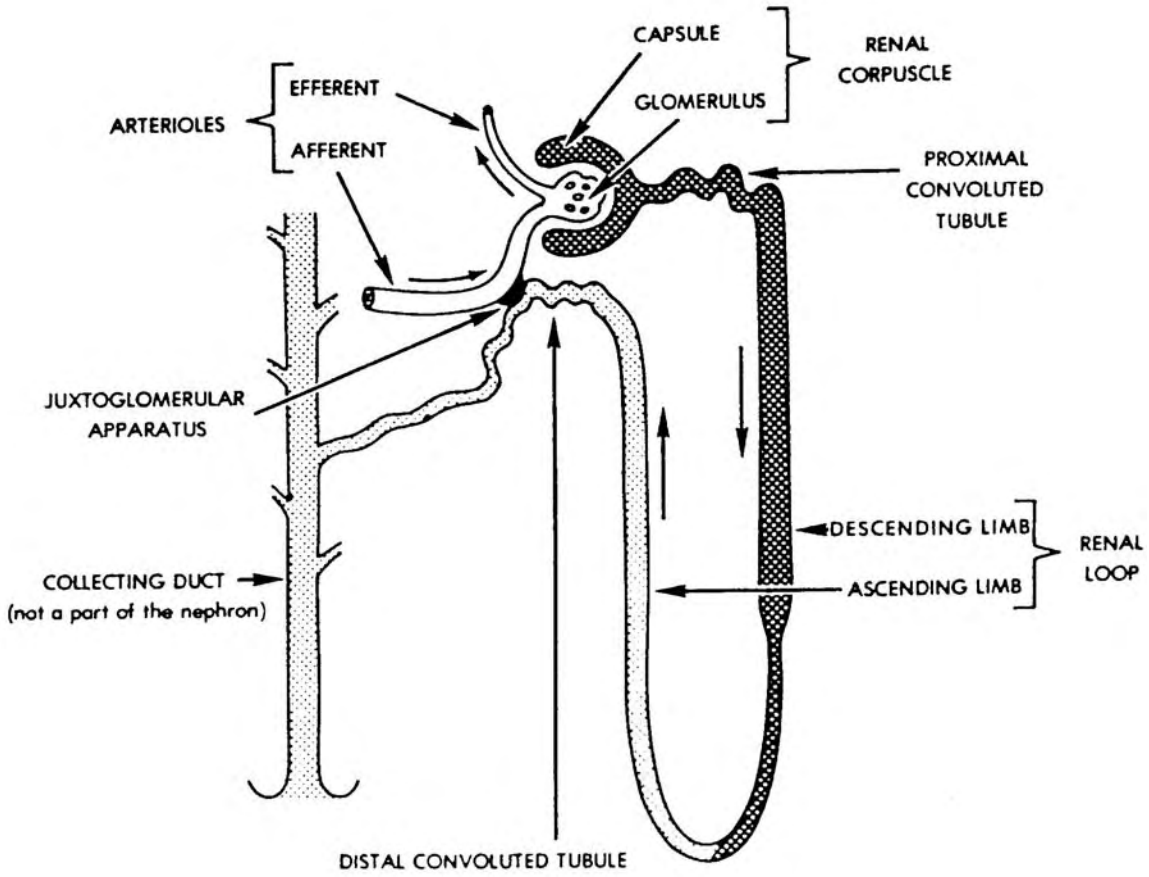

Figure 4-2. The nephron unit.

(1) Renal corpuscle.

(a) Structure. The renal corpuscle has a hollow double- walled sac called the renal capsule (Bowman's capsule). Leading into the capsule in a very small artery called the afferent arteriole. Within the capsule, this artery becomes a mass of capillaries known as the glomerulus. An efferent arteriole drains blood away from the capsule. The capsule and glomerulus together are known as the renal corpuscle.

(b) Function. An afferent arteriole supplies blood to the glomerulus. An efferent arteriole drains blood from the glomerulus. The blood from the afferent arteriole fills the glomerulus. Because of a pressure gradient, a large percentage of fluid in this blood passes through the wall of the glomerular capillary. The fluid then passes through the inner wall of the capsule. This brings the fluid into the hollow space between the inner and outer walls of the renal capsule.

AFFERENT = carry to

EFFERENT = carry away from

(2) Renal tubule.

(a) Structure. Each renal capsule is drained by a renal tubule. The first part of this tubular system runs quite a distance in a coiled formation and is called the proximal convoluted tubule. A long loop, the called the descending loop or the descending limb of Henle leads down to the medulla with two straight parts and a sharp bend at the bottom. The sharp bend at the bottom is called the loop of Henle and is U-shaped. As the tube returns to the cortex layer, it once again becomes coiled and here is known as the distal convoluted tubule. The distal tubule is the end of the nephron unit.

(b) Function -- tubular reabsorption. The fluid (also called filtrate) passes through the tubular system of the nephron. Here, the majority of the water, glucose, and other valuable substances are removed from the fluid and returned to the cardiovascular system. Essential electrolytes such as sodium, chloride, and bicarbonate are reabsorbed in the tubules. Reabsorption of sodium salts is controlled by the hormone aldosterone. Water and electrolytes such as glucose, amino acids, and nutrients are also absorbed from the renal tubes. Other fluids reabsorbed include water and nonelectrolyte such as glucose and amino acids.

(c) Function -- tubular secretion. Tubular reabsorption removes substances from the filtrate into the blood, but tubular secretion adds materials to the fluid from the blood. These secreted substances are included: potassium ions, hydrogen ions, ammonia, creatinine, and the drugs penicillin and aminohippuric acid. There are two main effects from tubular secretions. The substances in the secretions help rid the body of certain materials and also help control the blood pH.

4-4. GENERAL CHARACTERISTICS OF DIURETICS

The kidneys have an important role in maintaining the volume and composition of fluids in the body. It is sometimes necessary to reduce the amount of fluid in the body. Diuretics can perform this function. A number of diuretic drugs have been developed over the years. Most diuretics operate in one of two ways: they inhibit renal tubular sodium reabsorption or they increase the filtration of sodium. Drugs used as diuretics can be classified according to their specific effect on the renal system. In such a system, diuretics can be grouped into five classes: Water, osmotic diuretics, loop diuretics, thiazide diuretics, potassium sparing diuretics, and combination diuretics. Drugs used as diuretics effect the body is many ways, but remember that the chief effect on the urinary system is to increase the rate of urine formation and, subsequently, urine flow out of the body.

a. **Indications for Diuretic Use.** Diuretics can be given to patients with edema associated with congestive heart failure, cirrhosis of the liver, and early renal disease. Diuretics may also be administered to control hypertension.

b. **Contraindications for Diuretic Use.** Do not use diuretics for patients with late renal disease, pregnancy (the medication crosses the placenta), and hypersensitivity to the drug.

c. **Adverse Effects from Diuretic Use.** Included are the following: dehydration, electrolyte imbalance, and hypokalemia. The condition hypokalemia may be characterized by smooth and skeletal muscle weakness. The respiratory and cardiac muscles may be involved. Electrocardiogram (EKG) changes may occur with cardiac involvement. The patient may need potassium supplements in the form of drug therapy and/or foods.

4-5. TYPES OF DIURETICS AND LOCATION OF ACTION

a. **Water--a Diuretic.** When given in excess, water can act as a diuretic. At times, it may be necessary to limit the intake of water, but if, for example, medications irritate the urinary tract, a higher intake of water can stimulate excretion enough to avoid any real damage to the urinary tract.

b. **Osmotic Diuretics.** Certain nonelectrolyte with common attributes have been grouped together and called osmotic diuretics. Osmotic diuretics can be given in relatively large quantities. When so given, these diuretics contribute to the osmolality of plasma, glomerular filtrate, and tubular fluid in the body. Osmosis, osmolality - refers to the passage of pure solvent from a dilute solution to a concentrated solution. The dissolve substances solutions are concentrated through a semipermeable membrane that separates the two solution.

(1) Characteristics of osmotic diuretics. None-electrolyte action in the kidney depends on the concentration of osmotically active particles in solution. Most osmotic diuretics resist being changed by metabolism. An osmotic diuretic acts by decreasing reabsorption of water in the proximal tubule of the kidney due to increased osmotic pressure. The primary agent is mannitol (Osmitrol^{R}). The chief characteristics of these diuretics are:

(a) The nonelectrolyte are freely filterable at the glomerulus.

(b) The nonelectrolyte undergo limited reabsorption by the renal tubule.

(c) The nonelectrolyte are pharmacologically inert by conventional criteria.

(2) Specific indications for osmotic diuretic use.

(a) Prevention of treatment of an early oliguric phase (oliguria = abnormally low excretion of urine; in an average adult, less than 400 cm per day) of an acute renal failure. Conditions which might bring on acute renal failure include the following:

1 Cardiovascular operations.

2 Severe traumatic injury.

3 Operations in the presence of severe jaundice.

4 Management of hemolytic transfusion (blood transfusion) reactions.

5 Acute trauma.

6 Burns.

(b) Reduction of intracranial pressure and treatment of cerebral edema.

(c) Promotion of urinary excretion of toxic substances; for example, alcohol and drugs.

(3) Specific contraindications for osmotic diuretic use.

(a) DO NOT use if the patient has severe pulmonary congestion or congestive heart failure.

(b) DO NOT use if there is active intracranial bleeding. In this instance, vasodilation could occur because of increased plasma volume.

(4) Administration and dosage of osmotic diuretics. Proceed as follows:

(a) DO NOT infuse if crystals are present in the solution. Crystals can be removed by heating the vials with hot water or heating in a microwave.

(b) The usual dosage is 5 mg per kg.

(c) Osmotic diuretics act in 15 to 30 minutes after an IV infusion.

(d) Duration of diuresis (increased production of urine) if four to six hours.

c. **Loop Diuretics.** The primary agent of loop diuretics is furosemide (Lasix®). Loop diuretics act by blocking reabsorption of sodium in the ascending Loop of Henle.

(1) Specific indications for loop diuretic use.

(a) Pulmonary edema.

(b) Congestive heart failure.

(2) Administration and dosage of loop diuretics. Follow this procedure:

(a) Given an oral dosage of 40 mg one to two times a day. Lasix® may be given up to maximum dose of 120 mg three times a day.

(b) IV dosage is 20 to 40 mg. The diuretic acts 5 minutes after IV administration. The duration of action is about 2 hours.

d. **Thiazide Diuretics.** These diuretics are often classified as benzothiadiazides. The primary agents are hydrochlorothiazide (HCTZ, Oretic®, Esidrix®) and chlorothiazide (Diuril®). The diuretic acts in the distal tubule.

(1) Specific indications for thiazide diuretics.

(a) Less severe edematous states.

(b) Hypertension.

(2) Administration and dosage. Proceed as follows:

(a) This diuretic is usually administered orally.

(b) The duration of action is 6 to 12 hours, depending on the agent used.

e. **Potassium-sparing Diuretics.** The primary agents of this type of diuretic are spironolactone (Aldactone®) and triamterene (Dyrenium®). A potassium-sparing diuretic acts in the distal tubule. A specific indication for this class of diuretic is excessive potassium loss. DO NOT use if patient suffers from hyperkalemia. Spironolactone (Aldactone®) is given in the dosage of 25mg 4 times per day by mouth. Triamterene (Dyrenium®) is given in the dosage 100 mg every day by mouth.

f. **Combination type Diuretics.** The primary agent is thiazide with a potassium-sparing diuretic. Other agents are hydrochlorothiazide and spironolactone (Aldactazide®). Fixed dose combinations may be more convenient in patient management.

(1) Mechanisms of action. These diuretics act on different areas of the nephron unit at the same time. Diuresis is enhanced. Electrolyte imbalance is reduced.

(2) Specific indications for combination type diuretics. Combination diuretics can be used for patients with these conditions:

(a) Mild diuresis.

(b) Excessive potassium wasting.

(3) Contraindications for combination type diuretics. Do not use combination diuretics for patients with these conditions:

(a) Hyperkalemia. (elevated potassium level in the blood).

(b) Hypersensitivity to thiazides or potassium-sparing agents.

NOTE: Combination type diuretics are generally not prescribed as initial therapy.

4-6. CLOSING

Water is one of man's primary needs. Without a sufficient supply, all of us would soon perish. Likewise, excessive amounts of fluid in the body can be just as fatal. Out total body water and electrolytes are maintained in a delicate balance, and it is essential to exercise great care when administering diuretic agents. Indiscriminate use of these agents can result in severe fluid and electrolyte imbalance, which can be fatal to the patient.

Continue with Exercises

EXERCISES, LESSON 4

INSTRUCTIONS: Answer the following exercises by marking the lettered response that best answers the question or best completes the incomplete statement or by writing the answer in the space provided.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced with the solution.

1. A condition characterized by increased urine production and increased urine output is the definition of _____.

2. Agents that increase urine output are called _____.

3. List the main organs of the urinary system.

   a. _____.

   b. _____.

   c. _____.

   d. _____.

4. The _____ is the outer covering of the kidney, and the _____ medulla is the inner, reddish-brown region of the kidney.

5. Approximately how many nephrons, the working units of the kidneys, are in each kidney? _____.

6. Each nephron is made up a _____ corpuscle and a _____ system.

7. The function of the renal corpuscle in the kidney is to: _____

_____

8. In the process of reabsorption in the renal tubule, fluid passes through the tubular system of the nephron. In this process, substances such as water and glucose are removed from the fluid and returned to the _____ system.

9. Diuretics operate in one of two ways. List the two ways.

   a. _____.

   b. _____.

10. List four reasons to use diuretics.

    a. _____.

    b. _____.

    c. _____.

    d. _____.

11. Three reasons NOT to use diuretics are:

    a. _____.

    b. _____.

    c. _____.

12. Six types of diuretics are named in this lesson. They are:

    a. _____.

    b. _____.

    c. _____.

    d. _____.

    e. _____.

    f. _____.

13. What is the primary action of loop diuretics? _____

    _____.

14. List two specific indications for using combination type diuretics.

    a. _____.

    b. _____.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 4

1. Diuresis. (para 4-2a)

2. Diuretics. (para 4-2b)

3. Kidneys.
   Ureters.
   Urinary bladder.
   Urethra. (para 4-3)

4. Cortex.
   Medulla. (para 4-3a)

5. About 1 million. (para 4-3a)

6. Renal.
   Tubular. (para 4-3b)

7. The function of the renal corpuscles in the nephron units of the kidneys is to carry blood to (afferent) and carry blood away from (efferent) the glomerulus. (para 4-3b(1)(b))

8. Cardiovascular. (para 4-3b(2)(b))

9. Diuretics inhibit renal tubular sodium reabsorption.
   OR
   Diuretics increase the filtration of sodium. (para 4-4)

10. Edema associated with congestive heart failure.
    Cirrhosis of the liver.
    Early renal disease.
    Early renal disease. (para 4-4a)

11. Late renal disease.
    Pregnancy (medication can cross the placenta).
    Hypersensitivity to the drug. (para 4-4b)

12. Water.
. Osmotic diuretics.
. Loop diuretics.
. Thiazide diuretics.
    Potassium-sparing diuretics.
    Combination type diuretics. (paras 4-5a through f)

13. The primary action of loop diuretics is to block reabsorption of sodium in the ascending Loop of Henle. (para 4-5c)

14. Mild diuresis.
Excessive potassium wasting. (para 4-5f(2))

End of Lesson 4